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AUGUST, 1957

METAL FINISHING

LIBRARY OF CONGRESS
GENERAL RECORDS
AUG 13 1957
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DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

FOUNDED 1903

Highlights of the A.E.S. Convention
Report of Activities in Montreal, Canada

Density and Porosity of Anodic Coatings on Aluminum
New Method of Determination

Barrel Finishing
Fundamentals and Principles

Application of Ultrasonics in the Electroplating Industry
Degreasing, Cleaning, and Plating

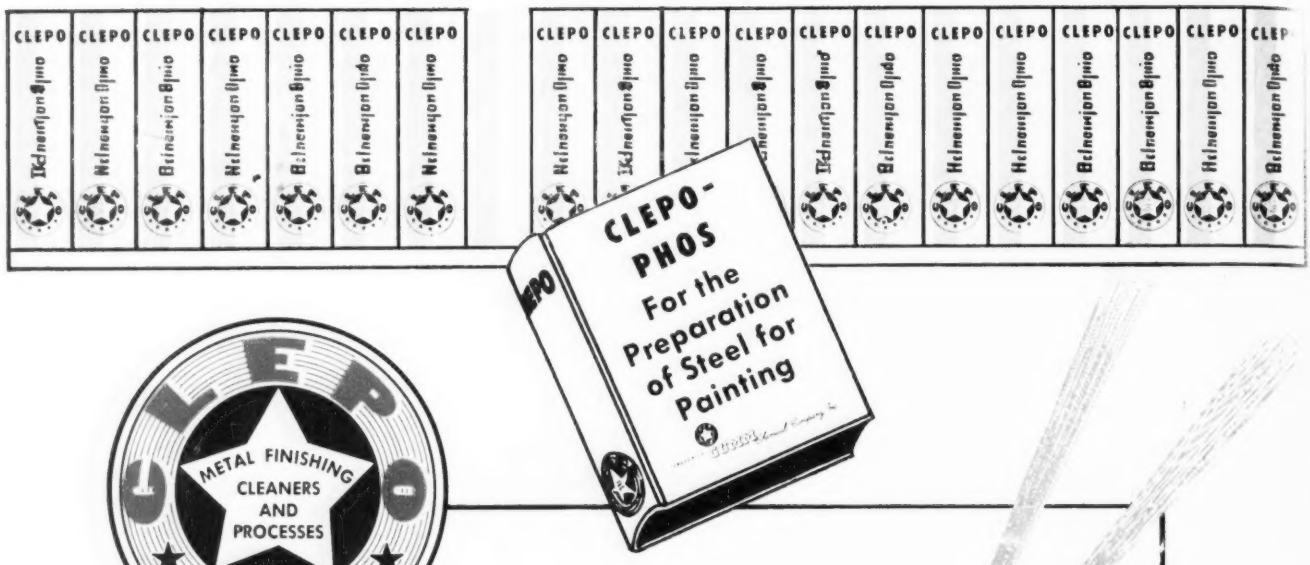
Finishing Pointers
Centralized Spray Rinsing

Science for Electroplaters
Waste Disposal

Complete Contents Page 47

READ & PASS ON

LIBRARY OF CLEPO SERVICE



CLEPO
METAL FINISHING
CLEANERS
AND
PROCESSES

Clepo-Phos *Conditions*

STEEL WHILE IT CLEANS

Reduces Foaming and Scaling to a Miniumum

CLEPO-PHOS so conditions the surface of the steel to be painted that it will anchor the coating firmly to the surface. Unconditioned surfaces produce poor bond, whereas a CLEPO-PHOS conditioned surface produces a lasting bond with the paint.

While this distinctive conditioning is of paramount importance, other operational values of CLEPO-PHOS should not be overlooked:

1. CLEPO-PHOS has excellent cleaning qualities.
2. CLEPO-PHOS is a low-foaming chemical, thus eliminating the need for adding anti-foaming agents from time to time.
3. CLEPO-PHOS does not tend to cake-up on coils or tank walls.

And CLEPO-PHOS is a 'one operation' formulation. It cleans and conditions simultaneously at exceptionally low cost. You should try CLEPO-PHOS in your production. Order a good workable test sample. Meanwhile discuss your pre-paint cleaning and conditioning problems with our Field Service Man. His experience and knowledge of the problems should be helpful.

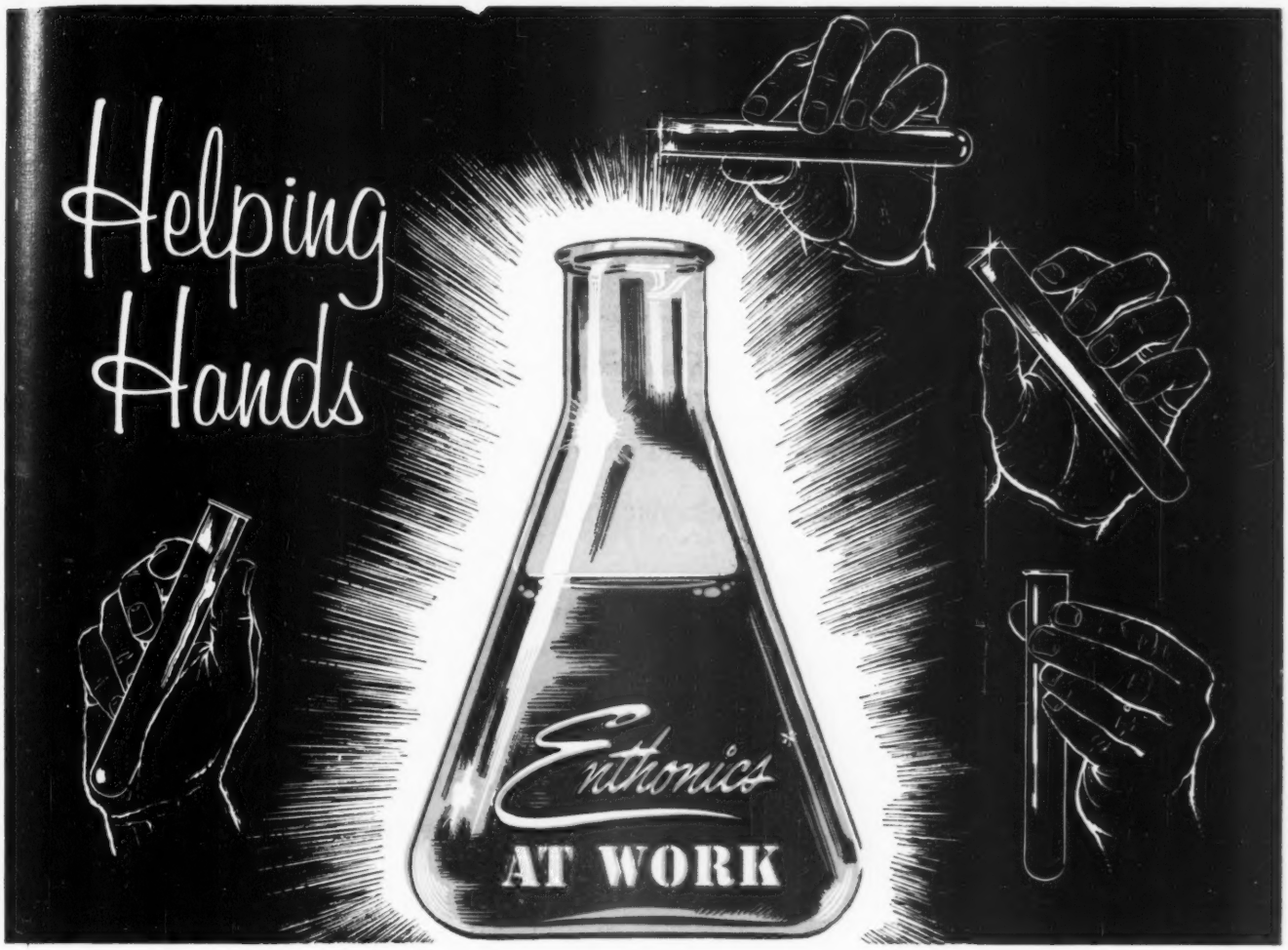
• • •

CLEPO-PHOS is only one of many, many chemicals developed by our research staff which combines technical skill and sound, practical knowledge of your industry's requirements. CLEPO stands for technical service as well as for quality products.

FREDERICK GUMM *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N.J.

AUG -6 1957



FROM THOUSANDS of TESTS . . .

. . . *come the solutions to your metal finishing problems.*

If *you* are looking for creative chemistry to supply new methods for the improvement of metal finishing, look to the leader – ENTHONE. Write for the answers to these problems, identifying them by number. If your specific problem is not listed, Enthone will gladly help to find the answer.

1. HOW TO BLACKEN copper, brass, zinc, steel and other metals to meet U.S. Government specifications.
2. HOW TO STRIP NICKEL from steel without etching the steel.
3. HOW TO STRIP NICKEL from copper and brass without attacking the part.
4. HOW TO SHED WATER from metals to prevent staining or spotting during drying.
5. HOW TO TRAP FUMES from hot sulfuric acid pickles.
6. HOW TO STRIP SYNTHETIC ENAMELS from aluminum and other metals without attacking the metal.
7. HOW TO CLEAN AND REMOVE RUST AND OXIDES from steel in one operation without acids.
8. HOW TO RINSE AND DRY STEEL WITHOUT RUSTING, using cold or hot water.
9. HOW TO SHORTEN ALKALI CLEANING TIME for steel to 15 seconds.
10. HOW TO REMOVE SOLID DIRT AND OIL from metals.
11. HOW TO STRIP LEAD, TIN or soft solder from copper and brass with no etching.
12. HOW TO PLATE METALS upon aluminum.
13. HOW TO REMOVE EXCESS SILVER SOLDER chemically from silver brazed steel parts.
14. HOW TO MAKE PAINT STICK to brass and zinc.
15. HOW TO SOLVENT-CLEAN parts and assemblies with cold non-hazardous solvent.
16. HOW TO OVERCOME CHROMIC ACID CONTAMINATION in cleaners.
17. HOW TO PREVENT STAINING of chromium plate.
18. HOW TO GIVE ZINC AND CADMIUM high salt spray resistance.
19. HOW TO COLOR ALUMINUM in one operation.
20. HOW TO STRIP METAL COATINGS from zinc die castings.

** The Scientific Solution of Metal Finishing Problems.*

ENTHONE
INCORPORATED

442 ELM STREET, NEW HAVEN 11, CONNECTICUT
Metal Finishing Processes • Electroplating Chemicals

Do you need answers to these questions?

1. How can I electroclean steel at lower cost?
2. How can I find a brass cleaner that gives better protection against tarnishing?
3. How can I reduce rejects due to faulty electrocleaning of zinc die castings?

Answer 1: Following an Oakite recommendation, one plater made a small change in his steel-cleaning cycle and soon had two tankfuls of cleaning solution doing the work of three—and the plate adhesion was improved. *See booklet offered below.*

Answer 2: Oakite has a new brass cleaner that provides scientific protection against the oxygen that tarnishes brass and other copper alloys during the application of reverse current. *See booklet offered below.*

Answer 3: Oakite has an anodic conditioner that offers brighter plating of zinc die castings . . . with no anodic blackening and fewer rejects. *See booklet offered below.*

FREE For more information about the electrocleaning of steel, brass or zinc die castings, send for one or all of the booklets listed in the coupon.

OAKITE PRODUCTS, INC.
18 Rector Street, New York 6, N. Y.

Send me the free booklets I have checked below:

- ☐ "Four good steps toward better electroplating on steel"
- ☐ "What's new for electrocleaning brass and other copper alloys"
- ☐ "Good news about electrocleaning zinc-base die castings"

Name_____

Company_____

Address_____

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

Technical Service Representatives in Principal Cities of U. S. and Canada

Export Division Cable Address: Oakite

4/Circle on Readers' Service Card

Metal Finishing is published monthly by the Finishing Publications, Inc., 381 Broadway, Westwood, New Jersey, U.S.A. Entered as second class matter at the Post Office in Westwood, N. J. Volume 55, No. 8, August, 1957. Four Dollars Per Year.

For 59 Years ...L'HOMMEDIEU...

year after year has manufactured Reliance Plating, Polishing Equipment, Supplies for Better and More Profitable Metal Finishing

RELIANCE PLATING BARRELS

Easy to Handle . . . Save Time and Money
Uniform Current Distribution
Plating Begins at Once

* * *

Lucite — Hard Rubber or Bakelite Cylinders
Motor — Geared in Head
Minimum Maintenance

* * *

Write for Reliance Plating Barrel Specifications

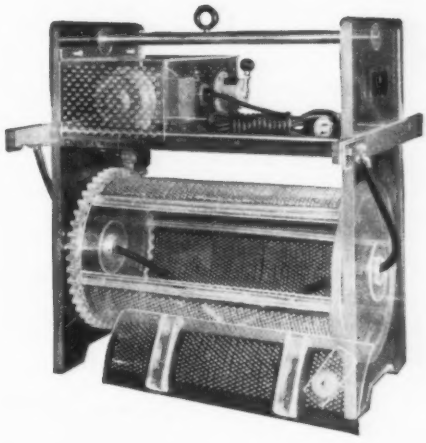
RELIANCE SELENIUM RECTIFIERS

Designed for all metal finishing operations.

High power factor and low ripple.

6 to 48 volts D.C.

Basic-self-contained or with Remote Control.



RELIANCE LUCITE

Portable Plating Barrel

Built of extra heavy High Temperature Lucite for volume production and stability.

Cylinder: 10"x18" inside. Equipped with Reversing Switch to permit stopping and securing barrel for loading and/or unloading.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS OF METAL FINISHING EQUIPMENT AND SUPPLIES
GENERAL OFFICE AND FACTORY
4521 OGDEN AVE. CHICAGO 23, ILL.

Chas. B. Little Co.
Newark, N. J.

W. R. Shields Co.
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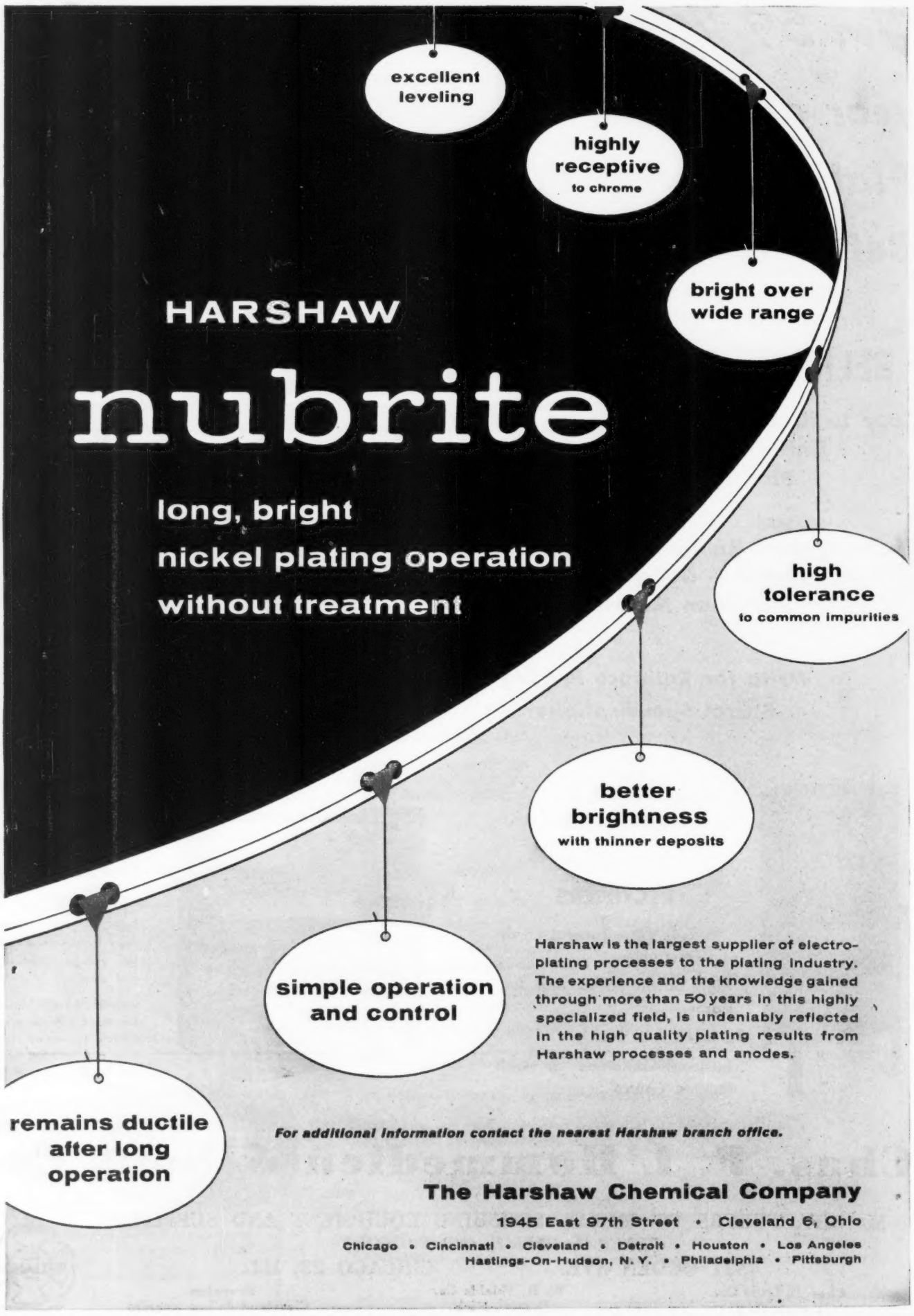
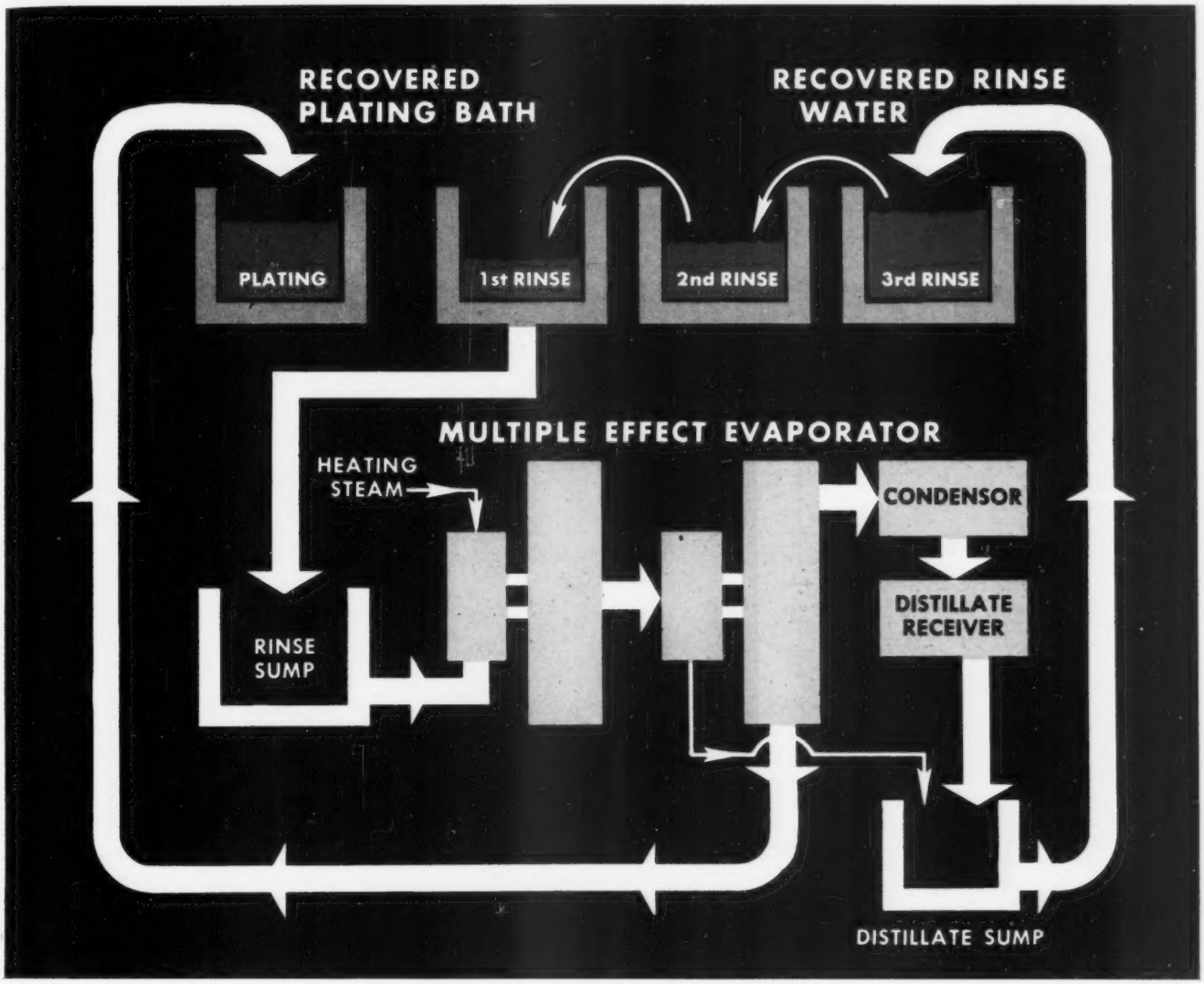
Branches:
Cleveland & Los Angeles


excellent leveling
highly receptive to chrome
bright over wide range
HARSHAW
nubrite
long, bright nickel plating operation without treatment
high tolerance to common impurities
better brightness with thinner deposits
simple operation and control
remains ductile after long operation
Harshaw is the largest supplier of electroplating processes to the plating industry. The experience and the knowledge gained through more than 50 years in this highly specialized field, is undeniably reflected in the high quality plating results from Harshaw processes and anodes.
For additional information contact the nearest Harshaw branch office.
The Harshaw Chemical Company
1945 East 97th Street • Cleveland 6, Ohio
Chicago • Cincinnati • Cleveland • Detroit • Houston • Los Angeles
Hastings-On-Hudson, N. Y. • Philadelphia • Pittsburgh



New recovery system cuts plating costs!

Industrial's Plating Bath Recovery Equipment provides complete recovery of acid and metal dragout losses, using a rapid evaporation process engineered to suit your operation. The savings can be fantastic... the system not only returns fresh plating solution to the bath and pure water to rinse tanks... it eliminates the high cost and trouble of neutralizing corrosive rinse water for disposal.

Here is a typical example of what Industrial engineers can do:

Saves $925.00 per week. A company plates metal parts with a copper-tin-lead alloy, using a series of plating machines with a total bath drag-out of 16.65 gallons per hour. Replacement of solutions and destruction of rinse water (to avoid damage to sewage systems and to meet anti-pollution requirements) costs $12.46 per hour. **Recovery with an Industrial unit costs $2.13 per hour.** The equipment pays for itself in 164 working days.

Unbelievable?... No sir!... These are systems designed by a company with a 30-year reputation for building the best in plating equipment. Let us prove it—our staff will be glad to make an analysis of your process, recommend equipment and estimate costs and savings.

Send for complete data . . .

INDUSTRIAL

FILTER & PUMP MFG. CO.

5906 OGDEN AVENUE • CHICAGO 50, ILLINOIS

Please send me reprints of articles and literature on Industrial's Plating Waste Recovery systems.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

New type chromium plate improves products

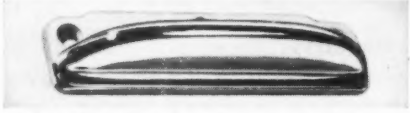
Why Crack-Free Chromium gives superior finish

Regular chromium plate develops a network of cracks as it is deposited. Through these defects, corrosives reach the underlying metal. Deposits from the Unichrome Crack-Free Chromium Plating Process remain structurally sound and continuous. This explains the wide difference in degree of corrosion protection obtained.

OTHER PROPERTIES

Crack-Free Chromium also provides:

1. Increased ductility, so that expansion and contraction cause no cracks.
2. Improved non-galling, non-seizing properties.
3. Low friction, resistance to wear.
4. Hardness (500 to 700 Knoop).
5. Excellent leveling action to help cover surface irregularities and reduce grinding needs.
6. Protection to the base metal without undercoats.
7. A satin matte *decorative* finish that can be applied directly to zinc die casting as well as steel. It buffs readily to high luster, can provide two-tone effects as shown below.



Bulletin CFC-2 gives more details on self-regulation and other features.

Unichrome is a trademark of Metal & Thermit Corp.

METAL & THERMIT
CORPORATION

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Pittsburgh • Atlanta • Detroit
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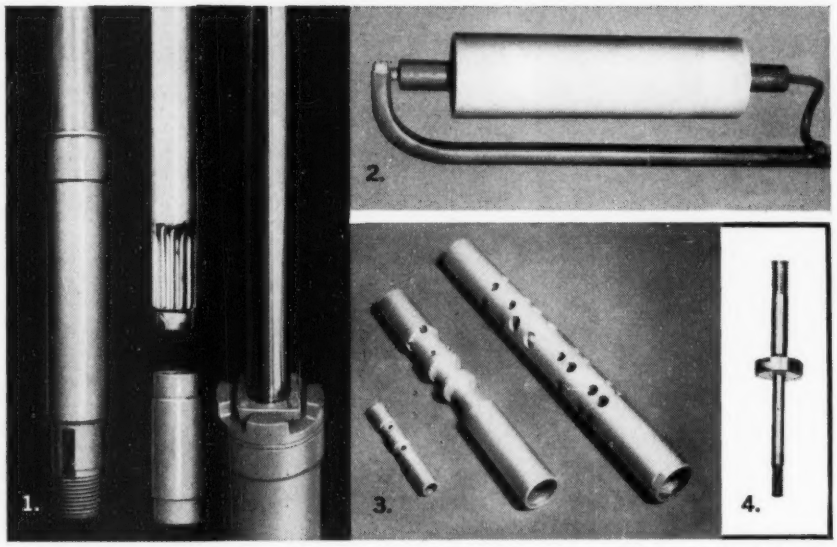
In Canada: Metal & Thermit—United Chromium of Canada, Limited, Rexdale, Ont.



A few of the applications where Unichrome Crack-Free Chromium can be used to protect against corrosion, heat, wear. (1) Washer shafts and sleeve; hydraulic ram. (2) Roller. (3) Heater nozzles. (4) Component part of power producing mechanisms.

Difficult problems created by heat, wear, corrosion solved by Crack-Free Chromium

Field reports confirm that Unichrome Crack-Free Chromium is truly a new type of chromium plate with valuable characteristics. It is being used in applications once thought impractical for chromium or other deposits—thereby opening new opportunities for electroplating. Here are some suggestions:

IMPROVING HYDRAULIC SYSTEMS

On hydraulic rams, power steering shafts, hydraulic jacks being plated with Crack-Free Chromium, relatively thin deposits protect against corrosion, reduce friction and wear. Where aqueous hydraulic fluid penetrated the cracks in .003 to .005" of ordinary chromium, a .0009" Crack-Free deposit stopped it.

Washing machine and typewriter parts, spline shafts, piston rings, relay armatures are other applications where corrosion problems have been solved.

COMBATING THERMAL SHOCK

Spouts for pouring 2250°F. molten glass into molds last four times longer when plated with Crack-Free Chromium instead of ordinary chromium.

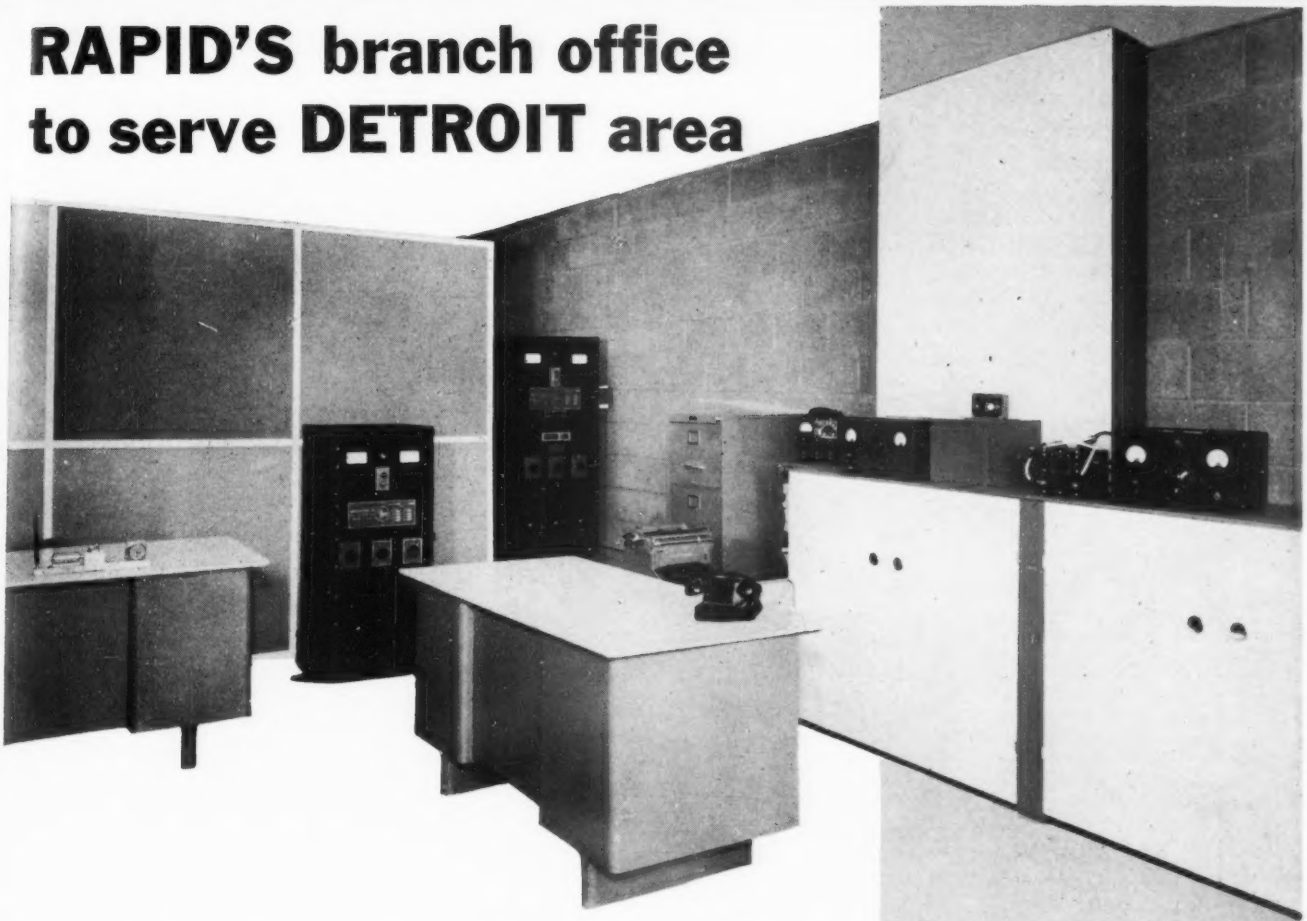
Increased ductility combines with resistance to thermal shock for other benefits. Crack-Free Chromium permits faster, deeper grinding cuts without fracture. On renewed transmission cams, this plate didn't fracture in service, whereas ordinary chromium did on 30% to 40% of the cams.

SLOWING DOWN WEAR

Crack-Free Chromium enables one user to increase life of textile machine rolls by 400% while cutting chromium deposit thickness 95%. It has also increased service life of drills, taps and reamers by 300%, compared with ordinary chromium.

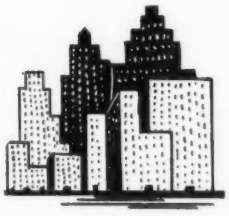
Results such as these are being made possible through platers who have installed Unichrome Crack-Free Chromium and are able to offer this new type of chromium. Write Metal & Thermit for more application possibilities.

RAPID'S branch office to serve DETROIT area



...*sales branch offers immediate stock delivery*

With the opening of our Detroit branch office we wish to thank all our friends for their patronage and co-operation extended through the years



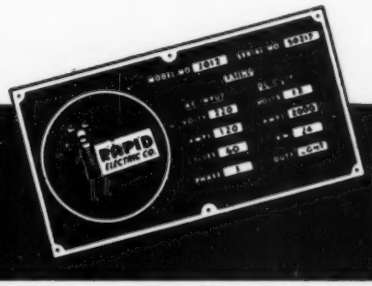
SALES · SERVICE · STOCK
PARTS REPLACEMENT · REPAIR

So that we may continue to serve you in the best way possible, we offer complete *sales*, *display* and *service* facilities centrally located at 12838 Fenkell Avenue.

Mr. George DeMirjian, a Detroiter for many years and well known in the plating industry directs sales-service operations. Facilities include repair and parts replacement, with standard rectifier units available from stock for immediate delivery.

Our Detroit branch office is another step in the direction of continually improving our service and providing the industry with the finest in precision built power rectifiers.

12838 FENKELL AVENUE DETROIT, MICHIGAN



THE NAMEPLATE THAT MEANS "*More Power to You!*"

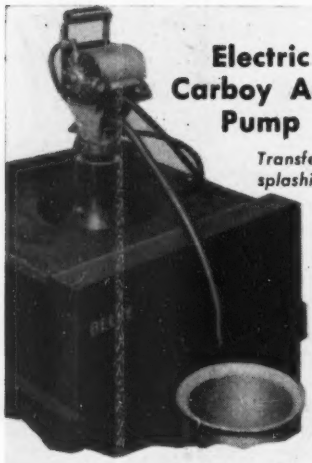
RAPID ELECTRIC COMPANY

12838 Fenkell Avenue • Detroit 27, Mich. • Diamond 1-8537
2881 Middletown Road • New York 61, N. Y. • TAlmadge 8-2200

HARD TO FIND PLATING ROOM ACCESSORIES

If you don't find it here — write.

Electric Carboy Acid Pump



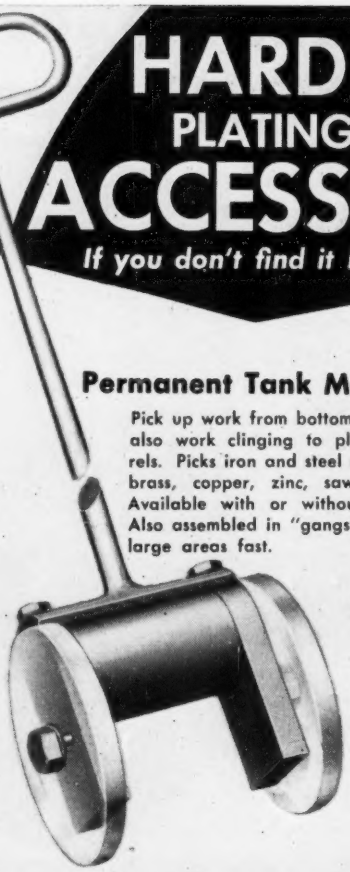
Transfers quickly, — safely — no splashing or blurping.

Self sealing rubber connector fits into carboy like a cork. Forces acid out in even flow. Air Safety Valve Lever stops flow instantly. Fits all standard 13 gal. carboys. Easily adapted to 6½ and 5 gal.

With lead tubing $81.40

With plastic tubing 86.90

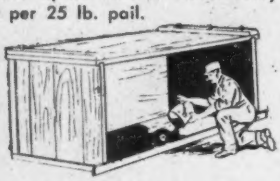
Permanent Tank Magnets



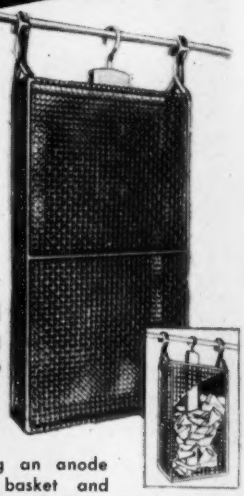
Pick up work from bottom of tank—also work clinging to plating barrels. Picks iron and steel chips from brass, copper, zinc, sawdust, etc. Available with or without wheels. Also assembled in "gangs" to cover large areas fast.

Easy to apply Rubberite Tank Lining

Make a lasting lining that protects wood or metal tanks from acids and alkalies at room temperatures. Easily applied right in your plant. Just heat and pour on to thickness desired. Will not crack, scale or peel in hottest weather. Very economical. 2 pounds lines one square foot ¼" thick. Only $4.75 per 25 lb. pail.



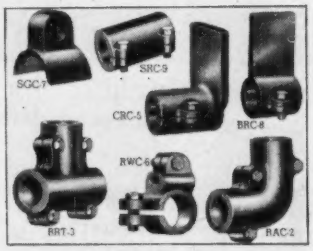
Nickel Saving Scrap Anode Baskets



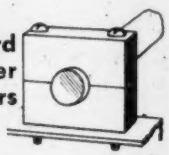
Merely hang an anode inside the basket and pour the scrap anodes around it. Ruggedly made—insulated. Specify length, width and depth when ordering.

Cast Copper Bus Bar Connectors

All shapes and sizes
Order by number and specify diameter of openings

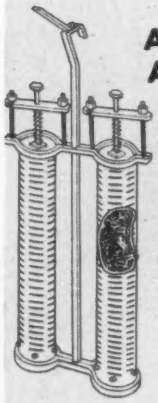


Hard Rubber Insulators



For 1" or 1¼" rods $1.95
For 1½" rods,..... 2.20
For 2" rods,..... 5.50

Aluminum Parts Anodizing Rack



Fast loading — time saving. For rivets, bolts, washers and other small aluminum parts. Just pour parts into the tubes and insert plunger. Spring tension makes positive contact between parts. Standard tubes are 22½" long, 2½" O.D.

Newest Style Ball Anode Baskets

For round or flat top anodes. No lodging. Heavy gauge steel, welded.

Dim. A	Dim. B	Price each
16"	4"	$1.15
20"	4"	1.20
25"	5"	1.40
31"	5"	1.55

Other dimensions to order.

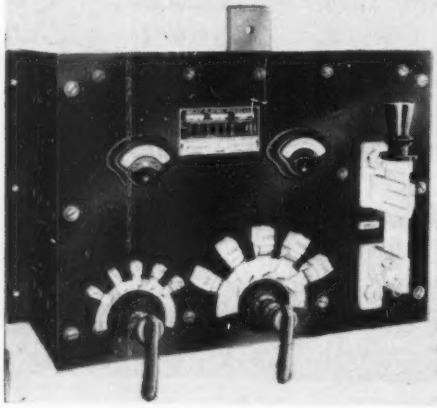
Fast Loading and Unloading Racks for Chrome Plating Screws, bolts, rivets, etc.

To load—stretch rack on racking board. Insert pieces. Release rack to lock pieces under tension.

To unload—Hold rack over container and stretch. Made of ⅛" phosphor bronze. Holds parts to ¼" diameter.

Racking Board only $4.50

Rack only $8.50 Holds 50 pieces



Close Regulating Tank Rheostats

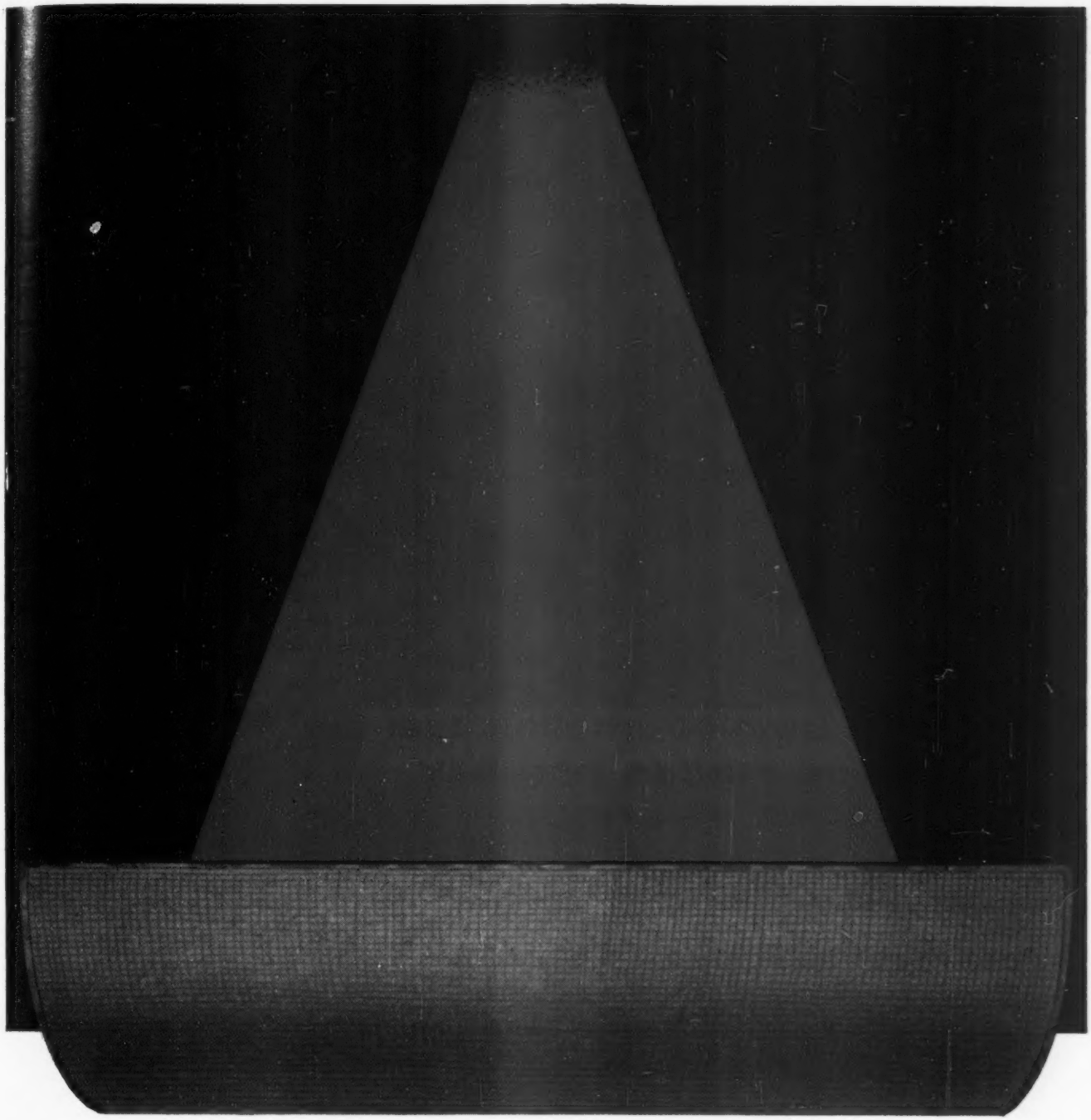
Commutating type. Regulate current in one ampere steps. Any amperage desired from one to maximum rating of rheostats. Sizes from 5 to 10,000 amperes and larger.

Accurate control means accurate plating.

All prices F.O.B. Chicago, Ill.,

Belke Manufacturing Company
947 N. Cicero Ave., Chicago 51

EVERYTHING FOR PLATING PLANTS



the Mutual red carpet is out for every customer

If you use chromium chemicals, specify *Mutual*. At Mutual your order gets V.I.P. treatment from mail room to shipping room—not only when supplies are plentiful, but also when they're not.

Quality? High, uniform, the standard of industry for over fifty years. Expert technical service rounds out the picture.

Chromic Acid • Sodium Bichromate • Potassium Bichromate

MUTUAL

Mutual Chromium Chemicals

SOLVAY PROCESS DIVISION • 61 BROADWAY, NEW YORK 6, N. Y.

Allied Chemical

MEET "LITTLE STEVE," A NEW, SPACE SAVING, LOW COST AUTOMATIC PLATING AND IMMERSION PROCESSING MACHINE

Here's What "Little Steve" Can Do

- ELECTROPLATING
- ANODIZING
- BLACK JAPANNING
- ENAMELING
- ELECTROTYPE PLATING
- PLASTIC COATINGS
- HARD CHROME PLATING
- PHOSPHATE COATINGS

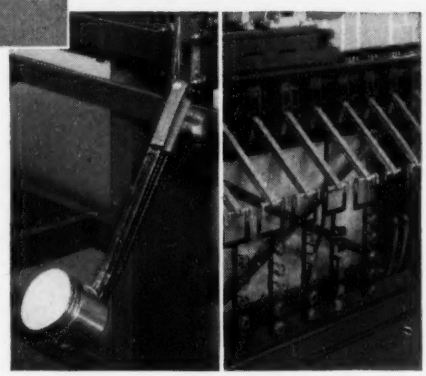
UP TO 40,000 PIECES PER DAY
540 RACKS PER HOUR

Yes, this new immersion processing machine by Stevens can process up to 40,000 pieces per day – and it has a variety of other uses too.

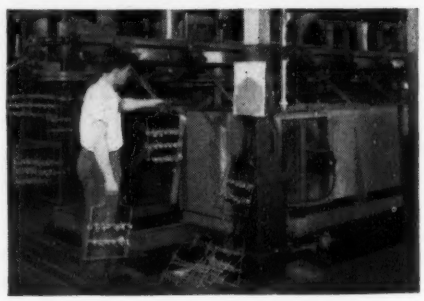
Ruggedly built "LITTLE STEVE," the big hit of the Metal Finishing Industry, can be obtained at a surprisingly low initial cost. It is ideal for large or small companies for it will fit many production cycles. It uses an arm as a rack or will take racks for small parts.

Being of small size it offers no floor space or load problems; involves low solution expense and means a small capital investment. It can be used easily as a laboratory testing machine.

For further information about "LITTLE STEVE" write for illustrated folder or call your local Stevens sales engineer.



A single part can be placed on each carrier arm as shown in the illustration above or racks of numerous parts can be used.



If a larger production model is desired the "Sgt. Steve" unit, using the same basic design, will provide the answer.

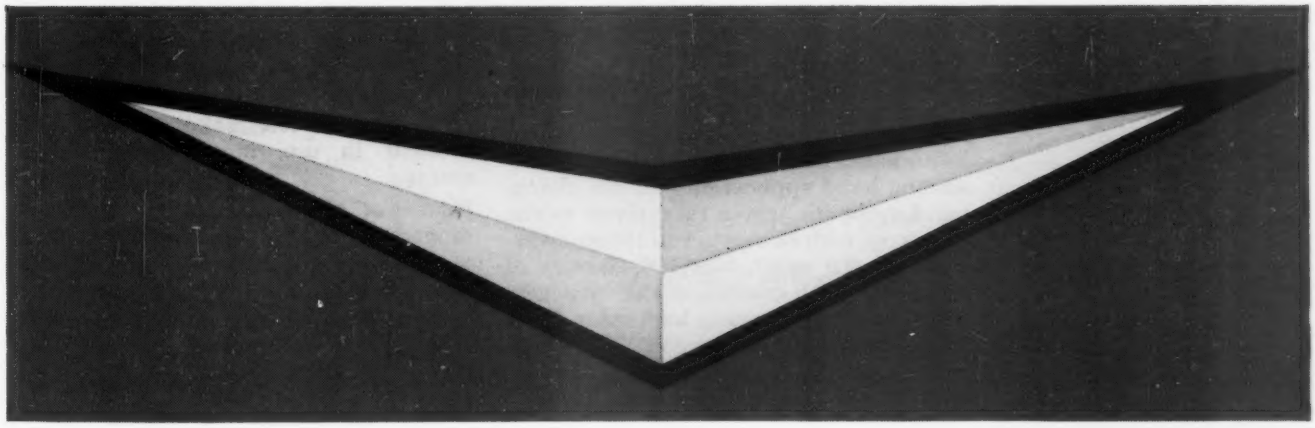
BRANCHES IN PRINCIPAL CITIES

FOUNDRY FACINGS | GRINDING OPERATIONS | BLAST FINISHING | BARREL TUMBLING | METAL CLEANING | POLISHING & BUFFING | AUTOMATIC FINISHING | AUTOMATIC PLATING | METAL RECLAMATION

Metal Finishing equipment and supplies from castings or stampings to finished product.

FREDERIC B.
STEVENS
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

NOW... light-fast, uniform-colored Aluminum!



PFIZER OXALATES can help you achieve sales advantages in the fast-growing field of colored aluminum.

Oxalates permit you to produce superior gold colored aluminum. Coloring is accomplished by precipitating iron oxide in the aluminum oxide coating from solutions containing ferric oxalate or ferric ammonium oxalate. Shades, from yellow to brown, can be obtained readily by varying the processing technique.

Why not investigate the big profit potential in producing better colored aluminum through the use of PFIZER OXALATES. Write for further technical information on Pfizer Oxalates.

Related to this field is Aluminum Company of America Patent No. 2,290,364, and possibly others.

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Pfizer

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Liquimatic eliminates costly, time-consuming hand application and bar changing. Liquimatic works right down to the last drop, with no nubbin to throw away. You get the exact, metered amount of compound with controlled viscosity from heavy cuts to extremely high color. Buffs last up to 200% longer. The compound does the work, *not* the buff.

Simple, rugged Liquimatic equipment is easy to install and maintain. Water-soluble compound is easy to wash down.

Its high flash point, long life, and non-settling properties make it safer, more efficient in use, more economical in storage.

Find out about the time, labor and money-saving benefits that are yours with Liquimatic. Write today for the new Liquimatic Application System folder.

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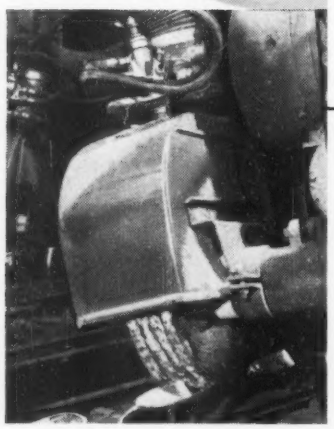

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An H-VW-M engineer will demonstrate the Liquimatic Automatic System, without obligation, right in your own buffing room. You can quickly learn how much you can save, if you are now using bar compounds . . . and how much H-VW-M Liquimatic compound will save over other liquid compounds.

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FOR STILL AND AUTOMATIC PLATING

STABILITY

ROHCO 503 resists breakdown at high temperature, giving peak economy of operation — generally 50,000 or more ampere-hours per gallon.

BRIGHTNESS

Uniformly high luster, from high current densities into the deepest recesses.

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Helps coverage in deep recesses or on high carbon steels.

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For maximum luster, corrosion resistance, and acceptance of chromate conversion coatings or black finishes.

ROHCO 503 is a balanced liquid formulation that has been tried and proven in 150,000 gallons of zinc solution. Remember, ROHCO analytical service and technical representatives are available for assisting you in conversion or any other plating problems. Send coupon for further details!

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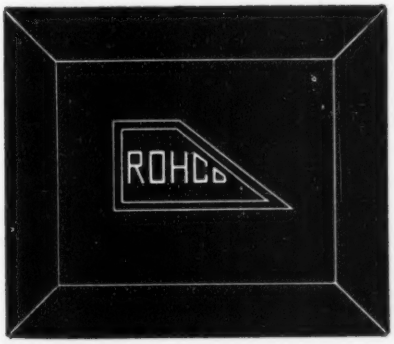

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Company .....

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Let DIAMOND's technical specialists zero in on your chrome-plating problems. These specialists are ready and able to handle your questions—quickly and completely. Their service is free.

In making chromic acid, DIAMOND controls quality from start to finish. DIAMOND experience begins with importing the chrome ore and making the soda ash. It includes *every step* through production and delivery, right up to standing by your side, if you wish, to help you get top-quality plating results consistently, economically.

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Diamond Chemicals

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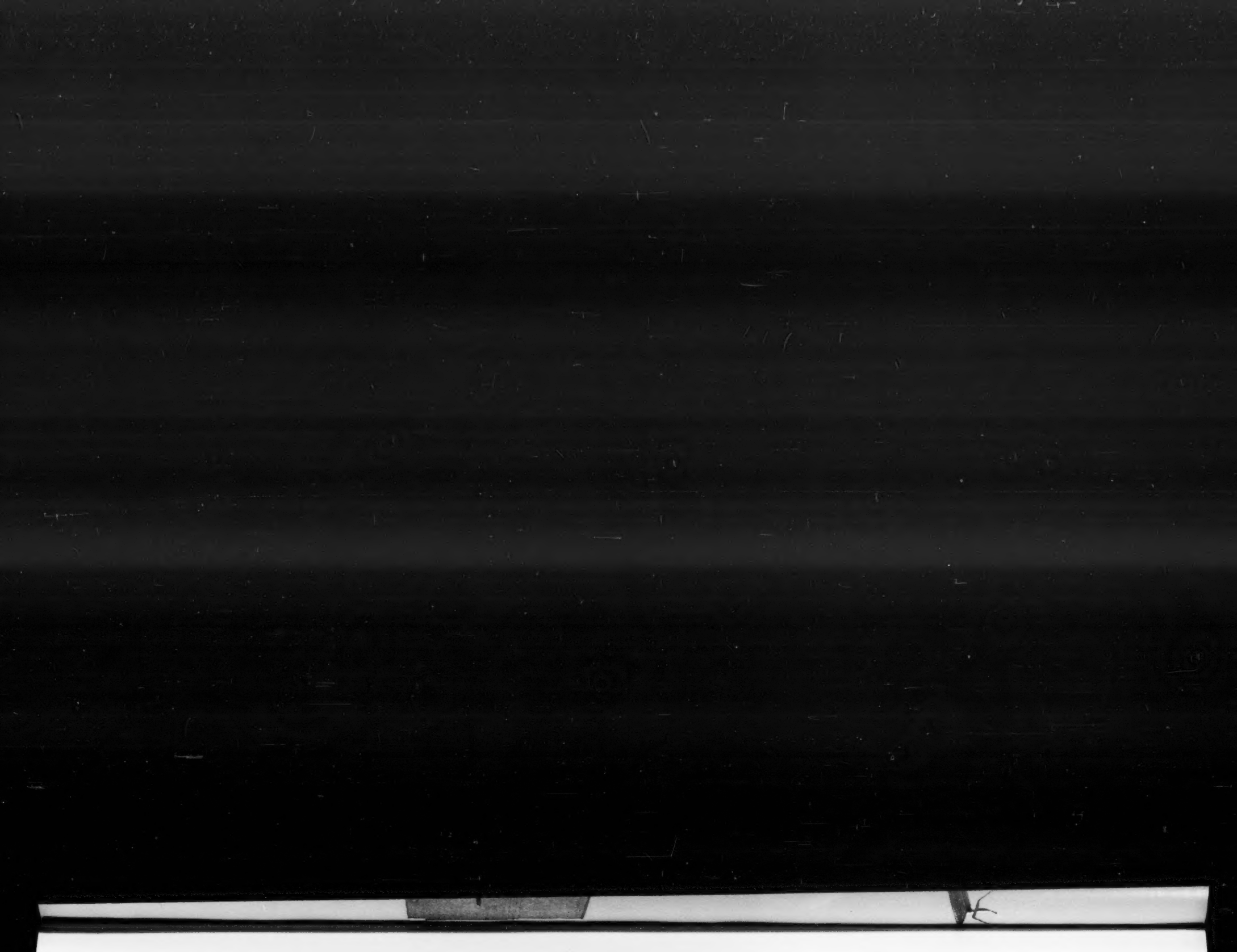
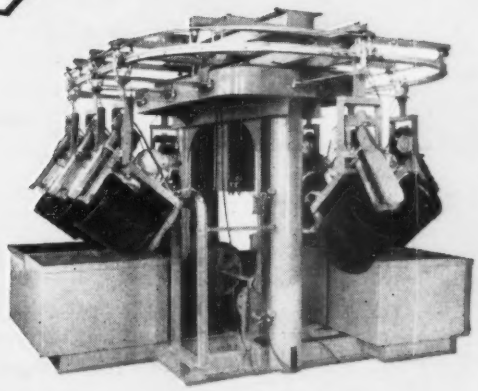
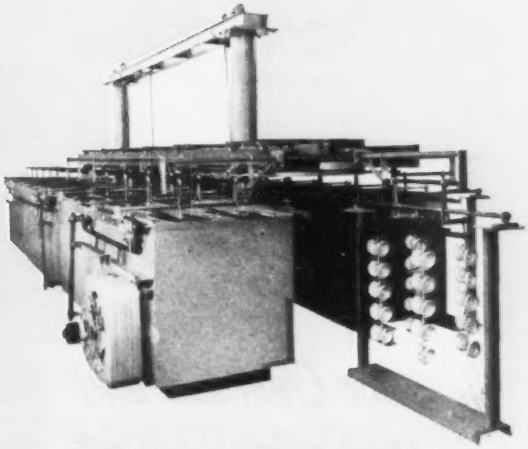
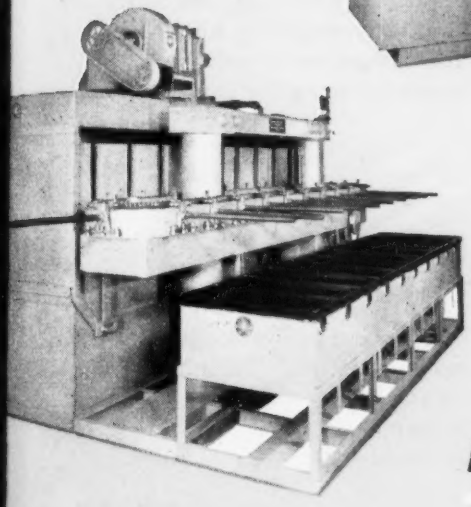


CROWN AUTOMATICS



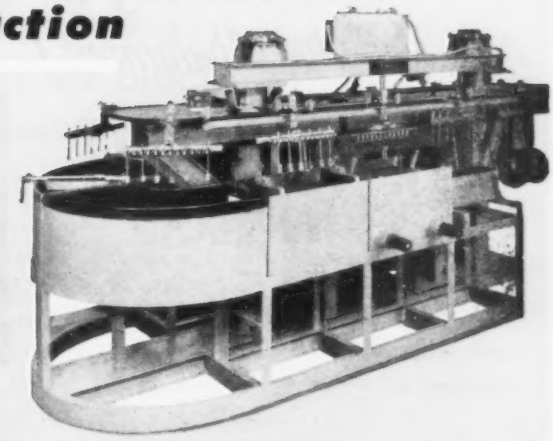


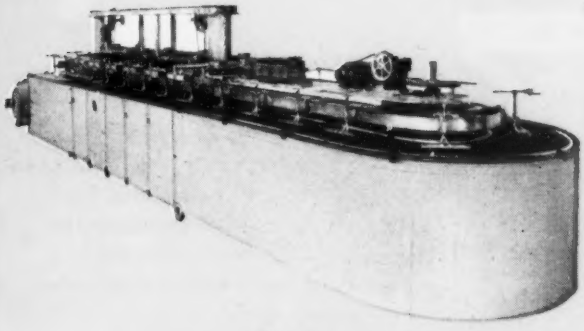


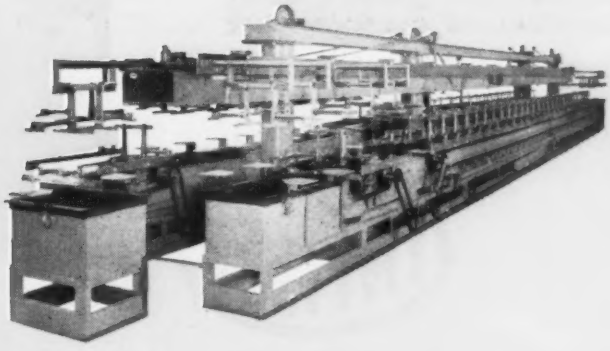
increase production

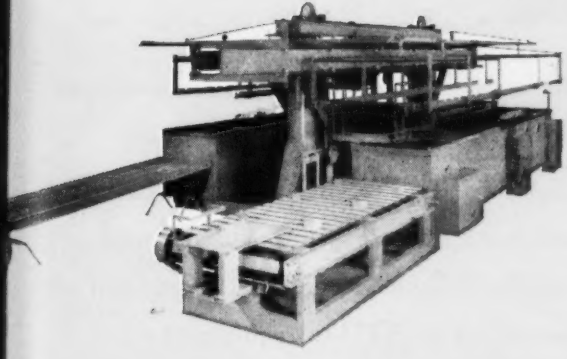
reduce costs

improve quality









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For Any Degree of Treatment!

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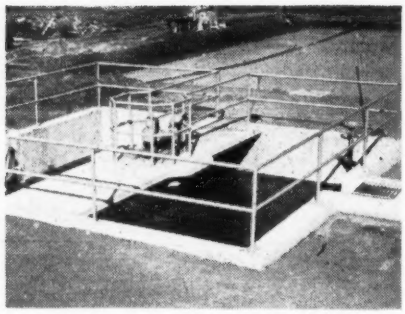

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2. Trouble-free operation with no under water bearings.
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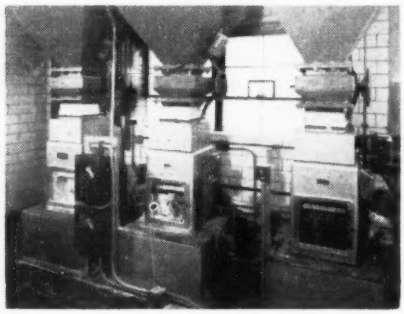
4. Can be installed in round, square, or rectangular basins.

Bulletin 700



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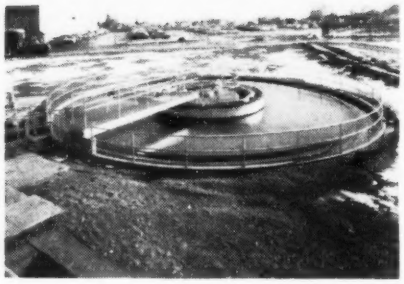
A complete line for solution, slurry, dry feed, and lime slaking. Adaptable for constant rate operations or proportioning by flow or pH control.

Request Information



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For clarification and precipitation of toxic metals. Controlled slurry recirculation results in better treatment at higher flow rates. Custom designed skimmers available when needed.

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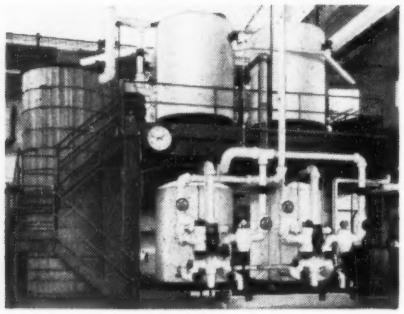

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recover chemicals and rinse water in many cases. For chromic acid purification and many recovery applications. Each problem is evaluated to determine the economics of recovery operations with the equipment custom engineered for each application.

Bulletin 1960

INFILCO

INFILCO will help you and your engineers evaluate any metal finishing waste disposal problem

Let us help you find the *best* way to meet your particular needs—the one combination of equipment for most economical results. Write for Bulletin 80 to acquaint you with the complete line of INFILCO equipment—for every type of water and waste treatment problem.

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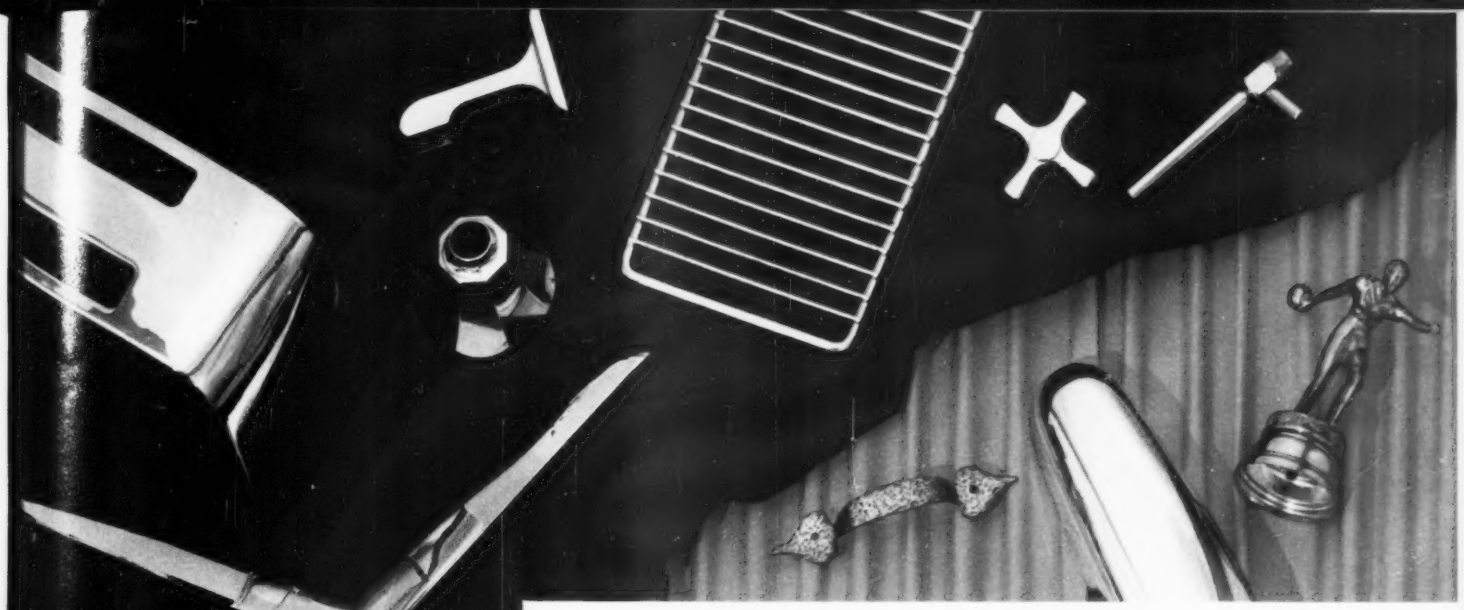
THE ONLY COMPANY impartially offering equipment for ALL types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.



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"Bright LUSTRALITE® 10"

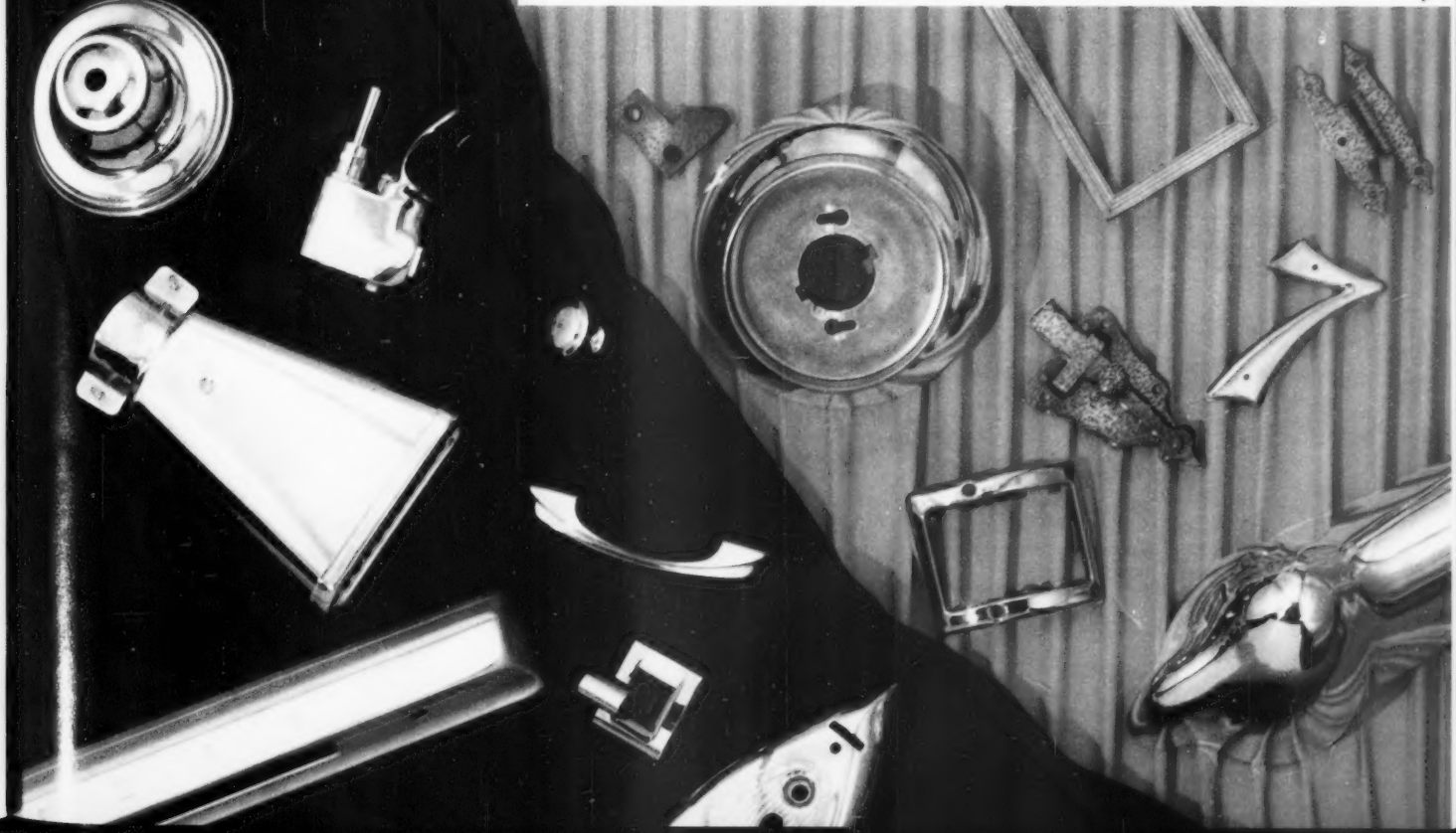
the revolutionary

BRONZE PLATING DISCOVERY that speeds and improves electroplating at lower production cost ...

"Bright LUSTRALITE 10" has proved its superior qualities in day-to-day use on products like these and many others.
It definitely makes finishing less expensive by eliminating buffing and minimizing the need for nickel. Yet it has excellent resistance to corrosion. The plate has exceptional leveling power, with a true bright finish.

"Bright LUSTRALITE 10" produces a brilliant, fine-grained hard bronze that's practical for both decoration and corrosion protection. Available through the same distributors that handle other Battelle processes listed on the opposite side of this page.

SEE OTHER SIDE FOR DISTRIBUTORS



. . . For more information about Battelle-developed processes, get in touch with any of these authorized Battelle Development Corporation distributors. Each is fully equipped to give you complete data and technical help.

THE ENEQUIST CHEMICAL COMPANY
100 Varick Avenue
Brooklyn 37, New York

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Rochester, New York

Be sure to read about "Bright LUSTRALITE® 10" on the opposite side of this page . . .

other Battelle Processes that simplify plating, add beauty and improve products

Electropolishing

A wide range of finishes is available. Gives products new sales values. Extraordinary smoothing action produces a micro-polished effect. "True metal color" is achieved with a lustre not attainable with belts or wheels. Metal surfaces remain undamaged.

Electrodeburring—*A variation of electropolishing, excellent for smoothing sharp, burred metal for safe handling and precision functioning. Indispensible for parts having burrs in hard-to-reach places. For many items, electroburring plus electroplating produces the best possible and most economical finish.*

Chemical Polishing

Smooths as it brightens. Won't etch. Brings out basic lustre. Especially suitable for small parts and those of intricate design. Can be plated over. Easy to install and operate . . . requires only a tank and heating element.

STANDARD® Bright Nickel

Produces mirror-like surfaces. Has excellent leveling action, ductility, and corrosion resistance. Very hard (Knoop 500-580) and wear resistant. On 18-gauge steel, can be bent around a ½-inch radius without cracking.

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Coats copper and a variety of brasses and bronzes against "green water." Coats wires against corrosion. Easily controlled cold bath.

LUSTRALITE® Electroplating Processes also include LUSTRALITE 20, a rich golden plate; LUSTRALITE 10, a deep bronze red; and LUSTRALITE 45, silver white, of sterling appearance. Data upon request.

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One Man Can Operate this FULLY AUTOMATIC PLATING and ANODIZING MACHINE!

LASALCO'S Cycleflex

- No costly overhaul or rebuilding is required for cycle changing on this *most versatile of all automatics*. Only the positions of pick-up heads need be moved, plus minor tank partition changes.
- All possibility of conveyor breakdown is eliminated with the electro-mechanical control and safety device. These make it impossible to push racks into side of tank and, in case of power failure during working transfer, prevents load from dropping.
- Because no elevating mechanism operates above rack carrier unusually low headroom is needed.
- Self-cleaning heavy duty contacts have positive 6-point connection . . . practically no attention is required.
- Tank surfaces are left clear by easily removable rack carriers . . . an advantage in servicing and in manual plating of large pieces.
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- Where conversion coatings and bright dips are used, a delayed set-down arrangement can be furnished to work automatically with the cycle.
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Hydraulic operation, standard;
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Send brochure on new fully automatic Cycleflex.

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Street Address.....
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HOME OFFICE: 2820 LaSalle St. • St. Louis 4, Mo. • PRospect 1-2990
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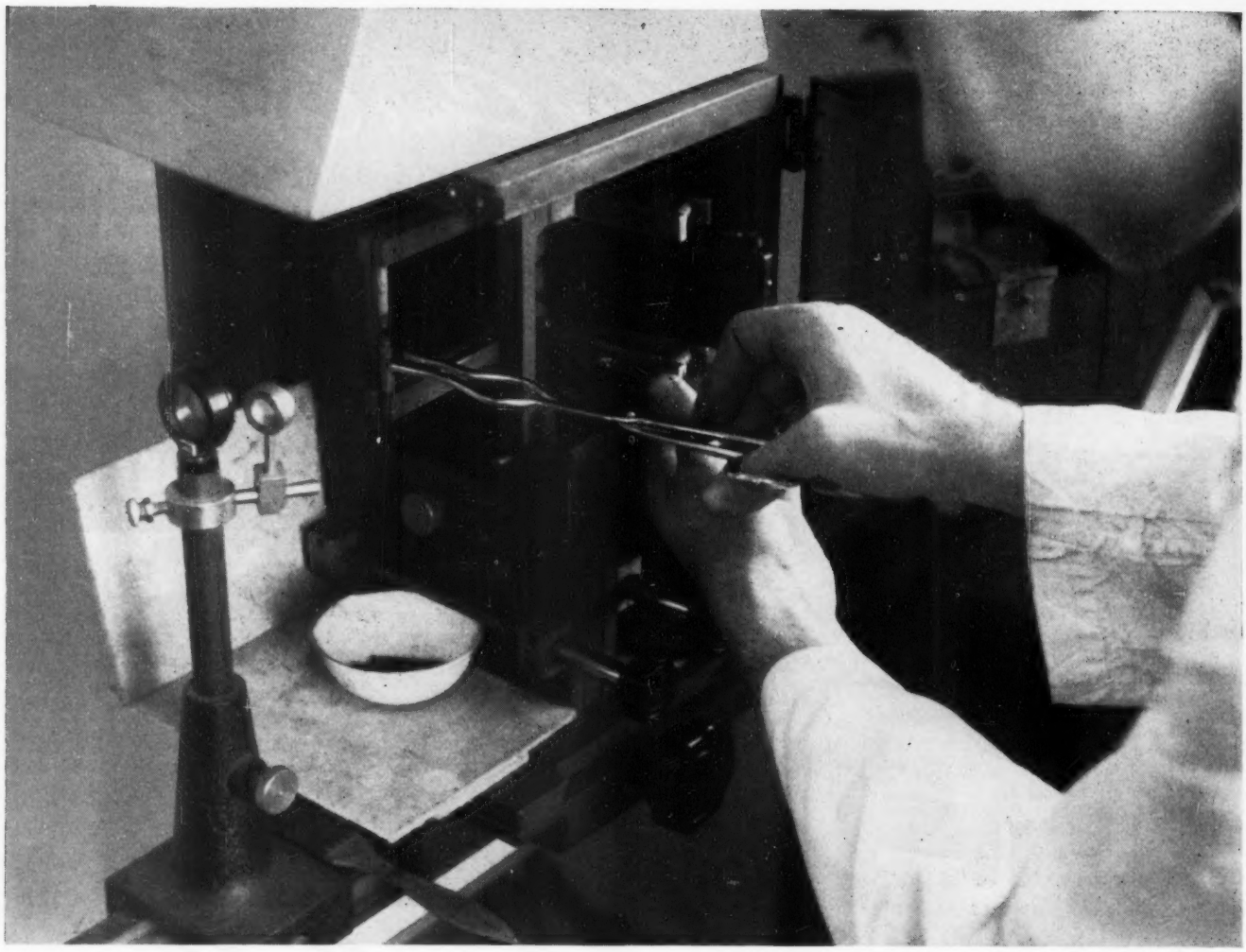

"We put a part of our company in every product"

"I guess you'd call our company a family business. My brothers and I have worked here almost as long as we can remember . . . and our Dad before us.

"We're not a big company as big companies go, but a few years ago we set out to make our Quality Control Lab one of the finest in the industry. We staffed it with men who are highly regarded and spent thousands upon thousands on test equipment . . . including the finest Spectrographic Instrument available. It took a lot of doing — and plenty of dollars, but it was worth it. We've grown steadily and it sure is a nice feeling to know that many of our regular customers include the finest platers in the country."

A. Kerzner

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A Timely Message on

Man's Mastery Over Shortages

by Ben P. Sax

Chairman of the Board, American Buff Company

Virtually wherever and whenever man has felt the pinch of scarcity, human ingenuity has produced some method or product to counter-balance the specific need. Whether the shortage problems were those of time, materials or skills—even rainfall—man has created astounding systems to surmount the situation.

Impossible only a few short years ago, many "miracles"—even cloud-seeding—now arouse little excitement and are accepted as daily routine. Yet they are responsible for bringing yesterday's luxuries into everyday availability.

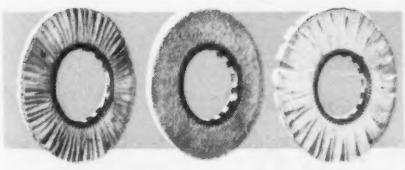
For example, the world's great dams produce gardens from barren soil, nourish and support millions of men and animals. Fast freezing conserves and permits distribution of life-giving goods, medicines, blood plasma. The need for immediate knowledge spurred the developments of electronic "wizards" which compute faster and more accurately than man can comprehend. Supersonic transportation establishes invisible highways throughout the known and unknown worlds. Automation makes a single human being the master of an intricate mechanical monster which can, without error, out-produce thousands of men and free them for new and more satisfying tasks.

In our own metal finishing industry, new types of buffs have created new peaks of production, using existing equipment with fewer workers—making possible greater output with lower unit costs. Today is but the preliminary step in an ever more marvelous world of man's victory over shortages.

Sincerely,

Ben P. Sax

"For the job that's TOUGH—use an AMERICAN BUFF"



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Patented CENTERLESS Construction
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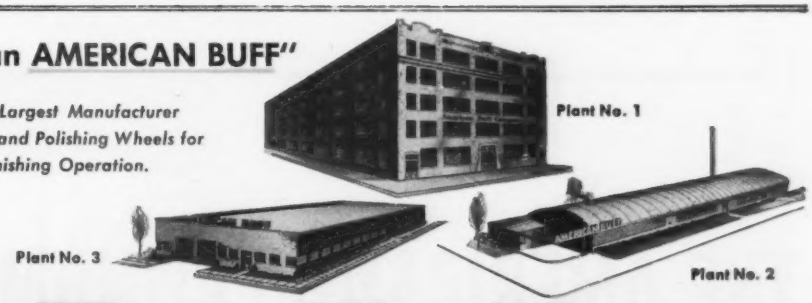
World's Largest Manufacturer of Buffs and Polishing Wheels for Every Finishing Operation.



American Buff Company
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AMERICAN BUFFS ARE REGULARLY ADVERTISED IN FORTUNE MAGAZINE

NEW SHAPED, EXTRUDED APW SILVER ANODES

STANDARD SHAPES

CONTROLLED GRAIN SIZE: APW EXTRUSION PROCESS* controls grain size within definite limits — minimizes sheddings

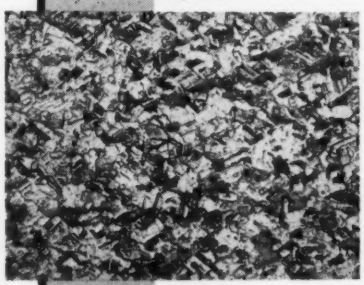
These scientifically shaped anodes retain 80% of original active surface area after 85% by weight has been plated off!

Costs are lowered by prolonged anode life, minimized polarization and less silver scrap to be refined.

In addition, the APW Extrusion Process controls grain size within definite ideal limits so that corrosion is smooth and uniform. Electrodeposits are *consistently* smooth. Shedding is virtually eliminated. Rejects are a comparative rarity!

We are anxious that the silver you buy in anodes is used most efficiently and economically. Special anode shapes will be engineered to meet your particular plating bath conditions. Call or write for a representative. We'll be glad to assist with your plating problems.

ROLLED FLAT PLATE ANODE SECTION:
This Photomicrograph shows highly irregular, uncontrolled grain size—a major cause of shedding and resultant rough electrodeposits.



APW EXTRUDED ANODE SECTION:
Small, fully controlled regularity of grain size promotes uniform corrosion, smoothest electrodeposits, less rejects.

*Pat. Pending

THE AMERICAN PLATINUM WORKS

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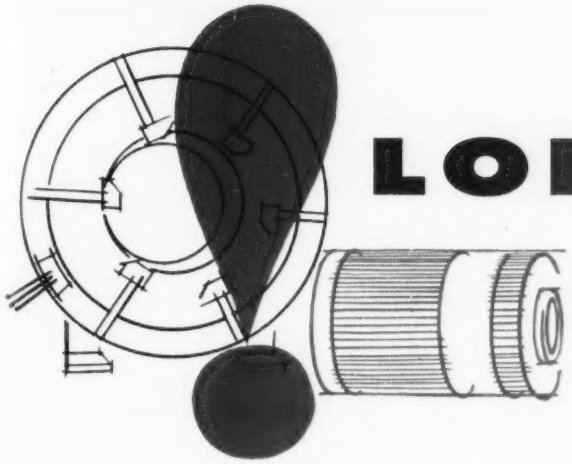

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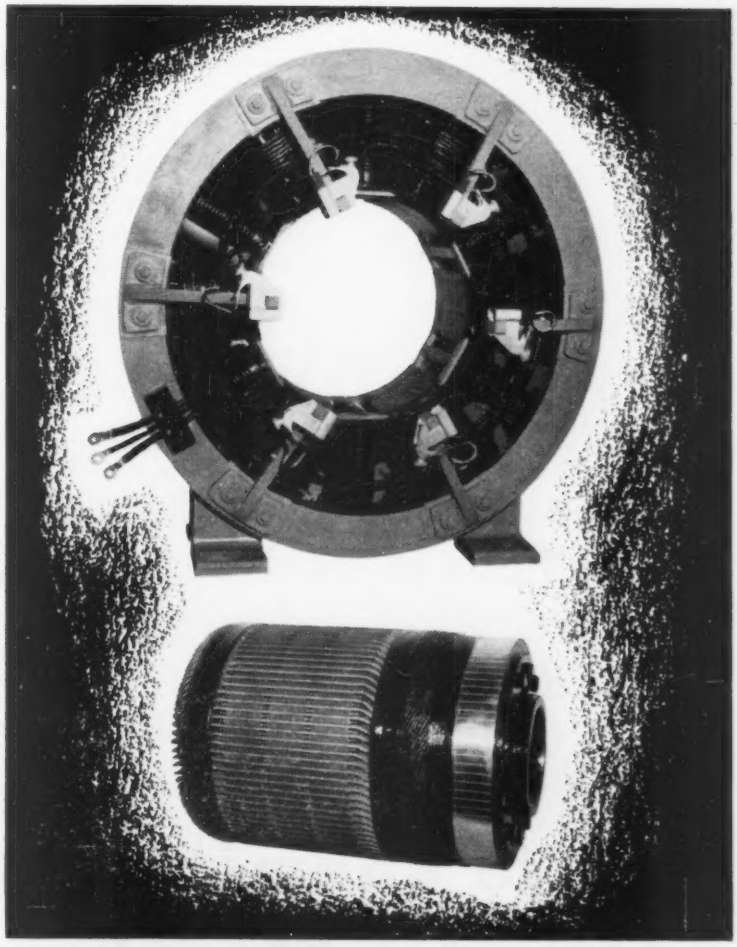
proves motor generators are your best investment in power conversion equipment

Chandeysson GENERATORS

outlive by 4 to 1, provide ample overload capacity plus versatility

Chandeysson Motor Generators are built to last and last. In fact, the life of an M. G. set is more than 40 years, while that of other forms of power conversion equipment is often only 10 years. Note the large over-sized exciter commutator and open construction. Just one more reason why Chandeysson sets are capable of carrying up to 150% load for short times without damage.

These are just a few examples of Chandeysson *performance* engineering. Behind every generator are decades of engineering and manufacturing know-how . . . consistent employment of only the finest, most durable materials . . . and user testimony to highest standards of performance and life-long service. For extra capacity to meet emergencies at the lowest possible cost . . . whatever your needs are in power conversion equipment . . . insist on Chandeysson low-voltage generators.



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With Norton barrel-finishing abrasives and methods

Manufacturer Saved Over $90,000 First Year

A prominent aircraft parts manufacturing company reports the following savings — typical of very many — gained by shifting from hand-finishing to Norton TUMBLEX* abrasives and barrel-tumbling techniques:

Number of Parts	Cost of Hand-Finishing	Cost of Barrel-Finishing	SAVINGS
312,906	$.1149	$.0207	$29,475.75
30,724	.091	.013	2,692.42
25,599	.114	.014	2,559.90
25,685	.100	.012	2,260.28
9,347	.103	.020	770.50

Total savings for all parts — including many more made by this single company — amounted to well over $90,000 the first year and is increasing steadily.

This is just one example of the amazing economy forward-looking firms are chalking up by converting to the know-how and materials Norton offers to all industry.

Your own metal parts can range from tiny needles to hefty forgings. They may be simple or complicated, hard metals or soft. Whatever they require, deburring, descaling or finishing to close tolerances — here's what you need to cut these operations to lowest cost.

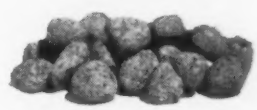
Thorough knowledge of the right size, type and shape of tumbling abrasives to use, and just how to use them.

You can get these "Touch of Gold" advantages from Norton. Just send sample parts to our Sample Processing Department and you'll be forwarded finished parts with complete facts as to abrasives, methods and equipment. Or write for further information to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

G-327

ALUNDUM* TUMBLEX "S". Bonded spheres that get into areas where other shapes can't reach. Exceptionally dense and long lasting. Five sizes.

ALUNDUM TUMBLEX "T". Bonded, triangular and fast-cutting for special shaped parts. They won't wedge in work slots or holes. Four sizes.



ALUNDUM TUMBLEX "A". For general barrel-finishing. Removes flash, scale, tool marks and burrs, while forming radii and finishes to required microinches. Twelve sizes.

TUMBLEX "N". Natural stones, exclusively Norton. For high lustre, especially on die castings and soft metal. Rounded shape brings up highest lustre. Seven sizes.

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Making better products . . . to make your products better

NORTON PRODUCTS:
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NORTHWEST

LEADS THE WAY WITH CHEMICALS FOR USE WITH

ALUMINUM

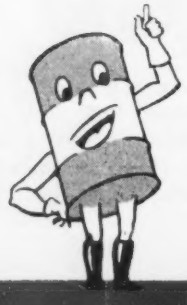
If you work with aluminum you'll be interested in Northwest's outstanding line of chemicals for use with modern alloys. Northwest's continuing research and development program has earned them the reputation of "First with the best" in this rapidly developing field. It will pay you to investigate:

- **ALKALUME CLEANERS—**
  A full line of cleaners and etching compounds especially formulated for use on aluminum alloys prior to plating, anodizing, painting or welding.
- **ALKALUME PRE-PLATE—**
  An especially effective zincate bath for preparing aluminum for plating.
- **ACID SOLVENT EMULSION CLEANER No. 1—**
  An effective cleaner for fabricated aluminum parts before finishing.
- **DRAWING AND STAMPING COMPOUNDS FOR ALUMINUM—**

Write for detailed literature.

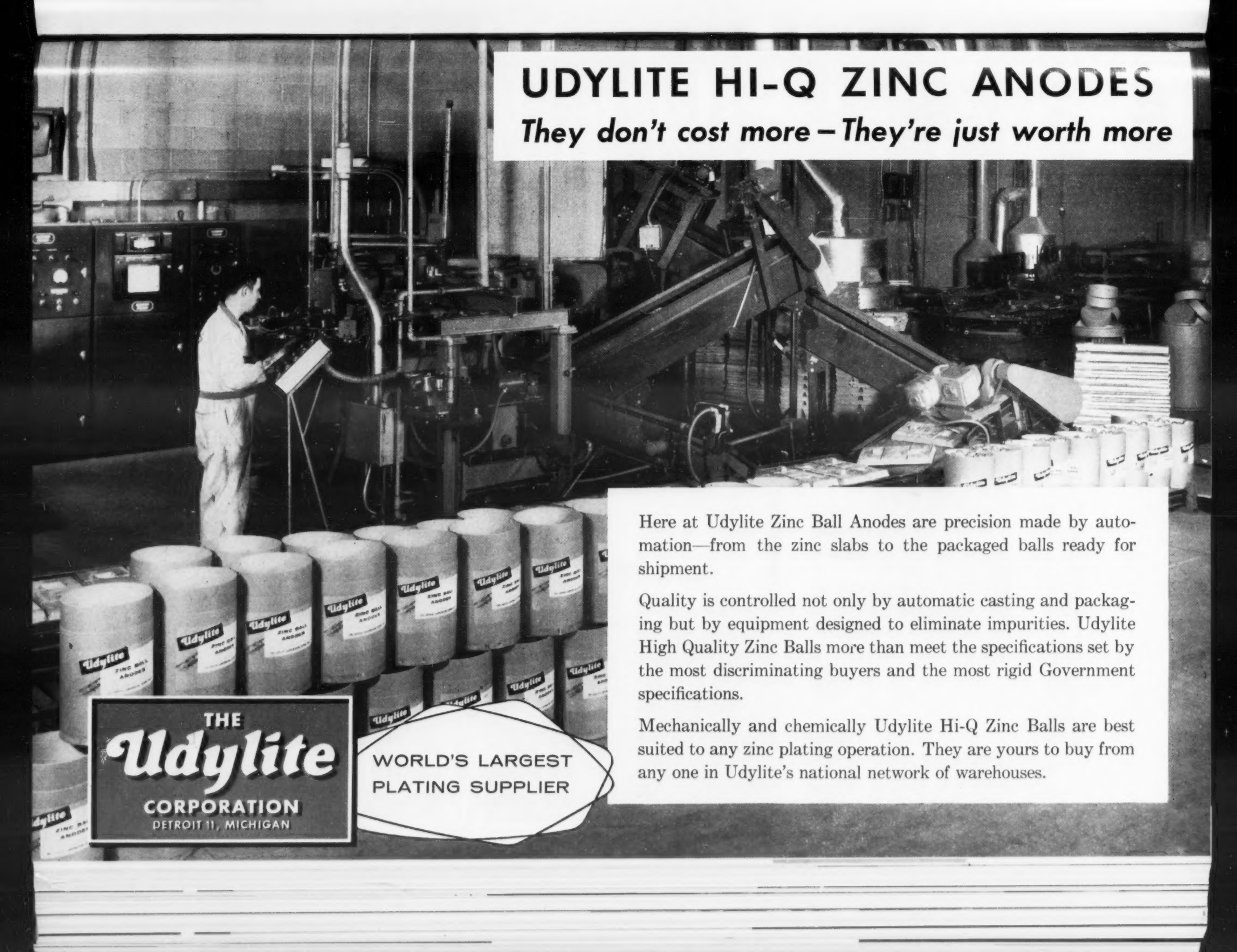
REMEMBER!

"Your cost per finished article is the true cost of your cleaner."



NORTHWEST CHEMICAL CO.

9310 ROSELAWN DETROIT 4, MICH.


UDYLITE HI-Q ZINC ANODES
They don't cost more – They're just worth more
Here at Udylite Zinc Ball Anodes are precision made by automation—from the zinc slabs to the packaged balls ready for shipment.
Quality is controlled not only by automatic casting and packaging but by equipment designed to eliminate impurities. Udylite High Quality Zinc Balls more than meet the specifications set by the most discriminating buyers and the most rigid Government specifications.
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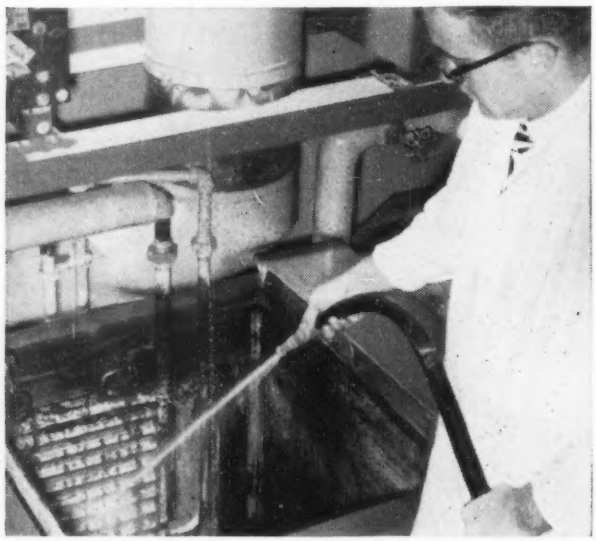
DETROIT 11, MICHIGAN
WORLD'S LARGEST PLATING SUPPLIER

Here's an aluminum ...reduces maintenance costs... ...MIL-

Ordinary caustic solution causes build-up of scale on tank interior. Scale must be chipped off frequently.



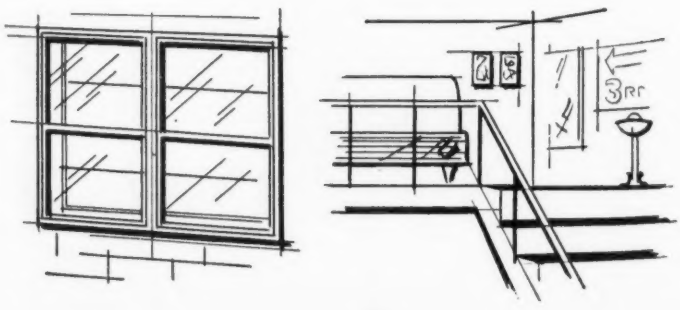
New Wyandotte Mil-Etch suspends dissolved aluminum in solution. No scale develops throughout entire life cycle.

Here's a brand-new caustic-type aluminum etchant that eliminates expensive shutdowns, needless maintenance and labor costs. Mil-Etch keeps dissolved aluminum in solution—prevents it from forming a hard scale that must be chipped from tank walls.

Etches rapidly and uniformly. Economically concentrated, Wyandotte Mil-Etch produces an attractive, uniform, high-quality etch in only a few minutes on aluminum extrusions, wrought sheets and bar stock. You can also use Mil-Etch for deep etching or chemical milling of aluminum alloys.

Easy to use. Mil-Etch is nondusty, will not cake

Use Mil-Etch for



etchant that eliminates scale produces a bright matte surface

ETCH!

in drums; also, no excessive foam or fumes. You can use a tank of Mil-Etch until it becomes "loaded" with dissolved aluminum. Tank dumping is simple – just pull the plug!

Desmutting. For brightening aluminum alloys that turn dark in alkaline etching processes, try Wyandotte 2487. It is safer than ordinary acid solutions, and permits a closer control of the desmutting bath. Being in easy-to-handle granular form, solution make-up and additions are simple.

For full information on how new Mil-Etch and Wyandotte 2487 will solve your aluminum-etching problems, call your Wyandotte representative.

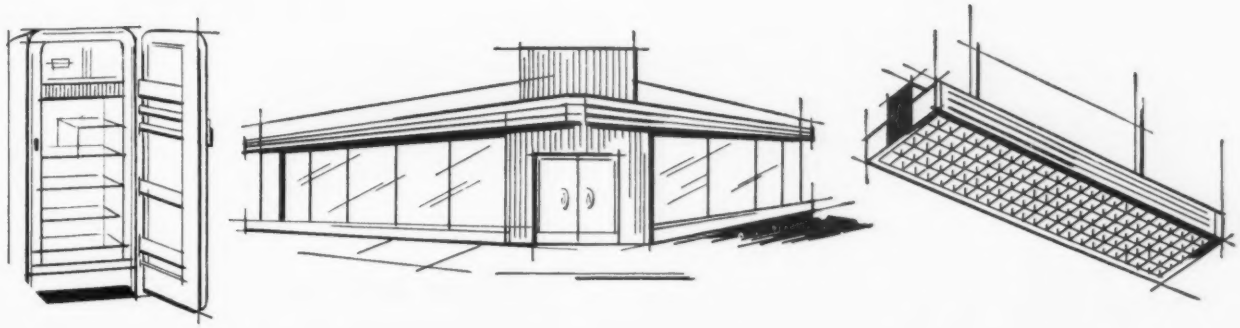
Wyandotte Chemicals Corporation, Wyandotte, Mich.
Also Los Nietos, Calif. Offices in principal cities.

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING

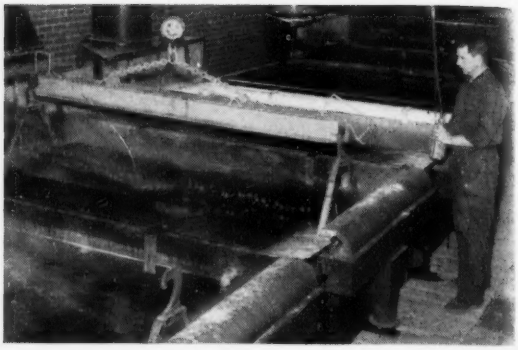
Wyandotte
CHEMICALS

J. B. FORD DIVISION

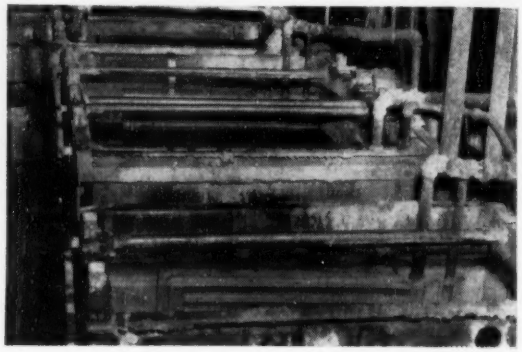
etching all aluminum surfaces



Knape & Vogt Manufacturing Co. finds Platecoil units require less tank space, reduce accidental shorting out and reduce time for cleaning because of their smooth surfaces.



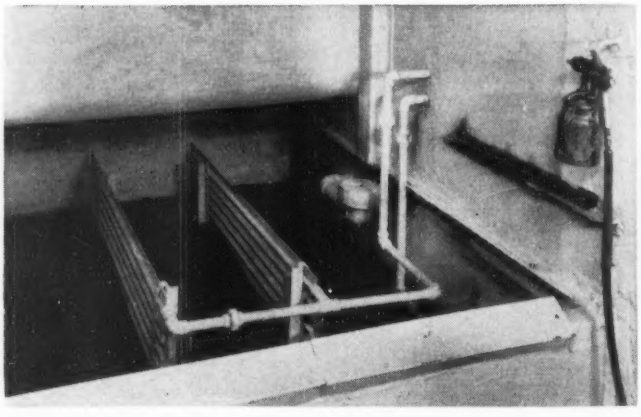
Platecoil at Athens Stove Works heats 1,800 gallons of water from room temperature to boiling in 2 hours. Pipe coils require 6 to 8 hours.



Platecoil units enable Kirsch Co. to reduce plating solution temperatures, obtain better appearance and shorten plating time. Temperature is maintained below 80° F.

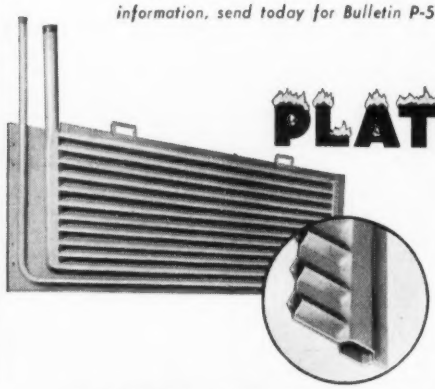
PLATING AND FINISHING MADE FASTER AND MORE PROFITABLE WITH TRANTER PLATECOIL®

Achieving more production in less time at lower cost helps sweeten the profit picture for platers and finishers. Tranter Platecoil units slash non-productive downtime, increase tank capacity and shorten operating cycles to make productive time more profitable. Greater prime heat transfer surface cuts heat up time compared to that required by old-fashioned pipe coils. Compact design gives more capacity in the tank for work loads compared to the space left by bulky pipe coils. The smooth surface of Platecoil resists fouling by deposits to cut cleaning requirements and to maintain efficiency. Easier to clean than a jumble of pipe coils, Platecoil units also save maintenance time. You'll find it profitable to use Tranter Platecoil.



Space limitations in the Addressograph-Multigraph plating department led to use of Platecoil. It cost less than pipe coils, improved efficiency and cut maintenance 50%.

It's TIME (and money) you save with Tranter Platecoil units. Order them now. Or for more information, send today for Bulletin P-52.



PLATECOIL®
DIVISION

TRANTER MFG., inc., Lansing 4, Michigan

You'll find our Catalog in Sweet's Plant Engineering File

Leading metal cleaning formulators can tell you— Dow Alkali does make a difference!

The average user of metal cleaning compounds can easily see the difference in performance between a good cleaner and a poor one. However, it's not so easy to detect the difference between two cleaners that give nearly equal cleaning efficiency.

Yet, there often is a difference.

Leading formulators of metal cleaning compounds know that the ingredients they start with make a difference—an important difference in cleaning efficiency. That's why they use Dow Sodium Orthosilicate and Dow Caustic Soda year in and year out. Experience has proved to them that these ingredients deliver the highest alkaline cleaning power they can buy at any price!

Ask your supplier of metal cleaning compounds about the important difference in formulations made with Dow Alkali. THE DOW CHEMICAL COMPANY, Midland, Michigan, Department AL 611K.

YOU CAN DEPEND ON DOW

Sparkle

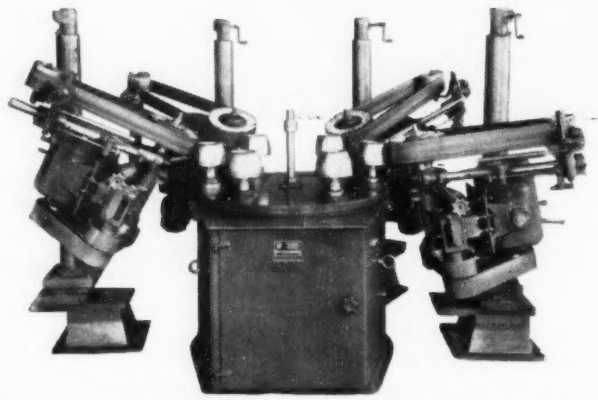
costs less when you polish and buff the *Acme* way!

It's the gleam in stainless, the sparkle in chrome that sells consumer goods today—a fact that makes the finishing line your most important operation. Unfortunately it may also be your most costly. This problem can be solved, however, by Acme engineers with Acme polishing and buffing machines.

Reduction of costly rejects, increased volume of production, complete machine finishing of odd-shaped problem pieces—these are a few of the cost-reducing solutions that Acme engineers have provided for troubled manufacturers. The cost is low, too, because these engineers combine Acme-designed *standard units* and a wide variety of accessories to design a *custom machine* for your job.

LET ACME *Polish Off* YOUR FINISHING PROBLEMS

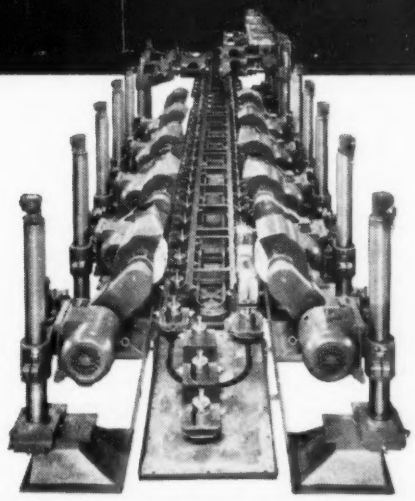
In plant after plant, Acme progressive engineering has built equipment that does it faster, and better, too. Every year Acme meets new parts and new finish requirements, each an individual problem. What's yours?



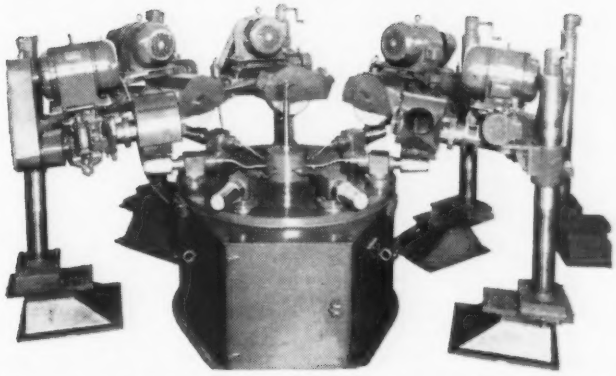
This Acme automatic 40-inch rotary with a six-station indexing table provides large volume polishing of cooking utensils. Four stations have Acme adjustable floating head buffing lathes with polishing belt arm attachments, and the remaining two stations are used for loading and unloading.

ACME MANUFACTURING COMPANY

LEADING PRODUCERS OF



Toaster bodies get fast, uniform buffing on this Acme 60-foot straightline conveyor with horizontal return. It is equipped with 16 heavy-duty adjustable floating head polishing and buffing lathes and universal indexing fixtures and adapters.



Vacuum chucking is featured on this Acme rotary automatic machine that buffs metal tumblers at low cost. This seven-station unit has five work stations and two loading and unloading stations. Typical of Acme flexibility, it easily changes to six work stations and one for loading and unloading.

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910

SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER III—Lustrous, Corrosion-Resistant Finishing with Chemical Polishing Iridite

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are widely accepted throughout industry as an economical means of providing corrosion protection, a good base for paint and decorative finishes for non-ferrous metals. Certain of these coatings also possess chemical polishing abilities that have luster-producing, as well as corrosion-inhibiting, effects on zinc and cadmium plate, zinc die castings and copper alloys. However, continued developments in this field have been so rapid that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this discussion of the many ways in which this chemical polishing characteristic can be used in final finishing or pre-plating treatments to produce a lustrous appearance with distinct display and sales appeal and appreciable savings in cost. Report I on decorative, corrosion-resistant finishes and Report II on paint base corrosion-resistant finishes are available on request.

The degree of luster possible on a surface is a function of the degree to which the surface can be smoothed. Leveling to provide a smooth surface can be achieved by mechanical or chemical means, or a combination of these, depending upon the luster desired and the original condition of the metal. Chemical polishing effectively imparts luster otherwise difficult and costly to obtain. For this reason, it is often used to supplement or entirely replace mechanical polishing, depending upon the application and the original condition of the metal. Chemical polishing has the additional advantage of providing overall treatment of the submerged part. It reaches into even the deepest corners and recesses that are otherwise inaccessible. Certain of the Iridites are specifically designed to perform this chemical polishing operation. Also, they provide corrosion protection as do all Iridites, thus may be used as a final finish or a pre-plating polish.

If Iridite is to be used as a final finish, in contrast to pre-plating treatment, the chromate conversion coating generated is allowed to remain, providing good corrosion resistance. Color inherent in these Iridite films ranges from a yellow cast to yellow iridescent. These coatings may be used without further treatment where this color is acceptable and good corrosion resistance is desired. Further, these basic coatings can be tinted by dyeing. Among the dye tints available are shades of red, yellow, blue and green. If desirable, the basic coatings can also be modified by a bleach dip leaving a clear bright or blue iridescent finish. In all cases bleaching reduces corrosion resistance.

As examples of this type of final finishing, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, lustrous chemical polishing of the as-cast surface of zinc die castings. Thus, in many cases, sizeable savings in finishing cost are realized by elimination of plating costs. This economical method can be used on tools, appliance parts, toy pistols, locks and many other small castings. Another example is the treatment of copper and brass parts, such as welding tips, to eliminate buffing and provide additional corrosion resistance. In many cases, handling costs are reduced appreciably by replacing piece-part handling with bulk processing. Still another example of the use of this chemical polishing and protective quality of Iridite is a simple system of zinc plate, Iridite and clear lacquer instead of more costly electroplated finishes. Typical of this type of lustrous finish are builders hardware and wire goods.

As a pre-plating treatment, in contrast to final finishes, Iridite can be used to chemically polish zinc die castings or copper prior to plating. In such cases, Iridite should be applied as an in-process step, so that the protective film is removed before the plating cycle. The savings in handling, material and labor costs are obvious. This process has made it practical to plate chrome directly over copper on steel, conserving nickel, yet producing a lustrous chrome finish. Used after stripping faulty plate in reprocessing zinc die castings, Iridite restores luster to the casting, thus making possible replating without blistering.

Other Iridite finishes are available to produce maximum corrosion resistance, a wide variety of decorative finishes and excellent bases for paint on all commercial forms of the more commonly used non-ferrous metals. As a final finish, appearance ranges from clear bright to olive drab and brown and many films can be bleached or dyed. As a paint base Iridite provides excellent initial and retentive paint adhesion and a self-healing property which protects bare metal if exposed by scratching. Iridites have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of their top performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product demands the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

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ENAMEL, LACQUER and SYNTHETIC COATING STRIPPERS —plus Lea Compounds— have contributed much to the organic finishing field

You know about the many Lea Compositions, both solid and liquid, that are doing such an excellent job of Burring, Buffing & Satin Finishing metal, plastic and wood surfaces.

Lea Products also serve the organic finishing field with equal efficiency and economy. For example:

- **First there is the use of one or more grades of Lea Compound to properly prepare metal surfaces for paint, lacquer or enamel adhesion.**
- **LEA SYNSTRIP . . . a fast working, non-corroding liquid enamel, lacquer and synthetic coating stripper; baked coatings slip off in sheets or shreds; will not attack aluminum, zinc or any other base metal or alloy; does not dissolve the coating but breaks the bond. When heated to temperatures of 160° to 200° F., stripping synthetic coatings of the alkyd, epoxy, phenolic, silicone and urea type, is accomplished in a matter of seconds.**
- **LEA COLDSTRIP . . . non-toxic stripper used at room temperature; only minimum ventilation; can be filtered for continued recirculation.**

While Synstrip and Coldstrip do similar work, the choice depends upon volume of work, operating conditions, ventilation facilities, etc. We suggest that you outline your set-up and let our technical staff recommend which of the two would be better for your stripping requirements.

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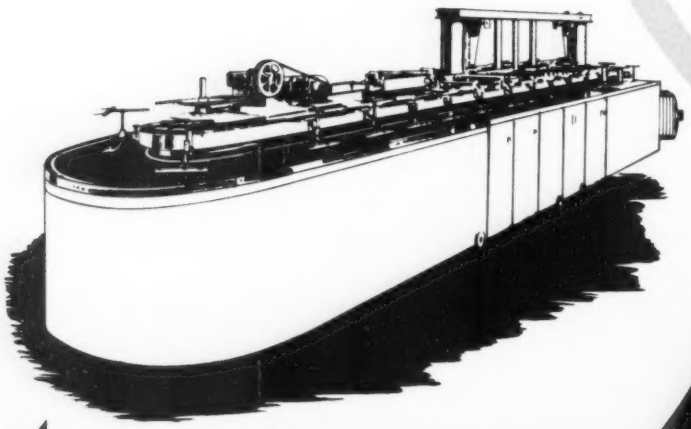
Lea-Ronal NICKEL GLEAM

✓ IMPROVED DUCTILITY
✓ GOOD LEVELING
✓ SIMPLE TO CONTROL
✓ EASY TO OPERATE

NOW *. . . plating with the Lea-Ronal Bright Nickel process will give you results unobtainable with other processes.*



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BRILLIANCE . . . this bath builds brilliance even over a non-brilliant base metal or prior deposit.

LEVELING . . . excellent leveling characteristics without sacrificing brilliance.

EXCELLENT CONTROL . . . control is simple, positive.

EASY OPERATION . . . easy to set-up, easy to run.

CURRENT DENSITIES . . . all durable characteristics are obtained under wide range of current densities.

THROWING POWER . . . brighteners do not adversely effect the throwing power.

CHROME RECEPTIVITY . . . excellent; no prior reactivation necessary.

TOLERANCE (CHEMICALS) . . . high tolerance to metallic and organic impurities and to wide variations in operating conditions.

TOLERANCE (ELECTRICAL) . . . current interruptions do not cause peeling or deposit lamination.

Whether your work is barrel or rack, you will get the above advantages with Lea-Ronal Nickel Gleam. Our laboratory will advise you how to convert your present process.

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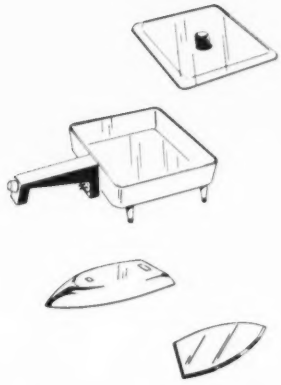

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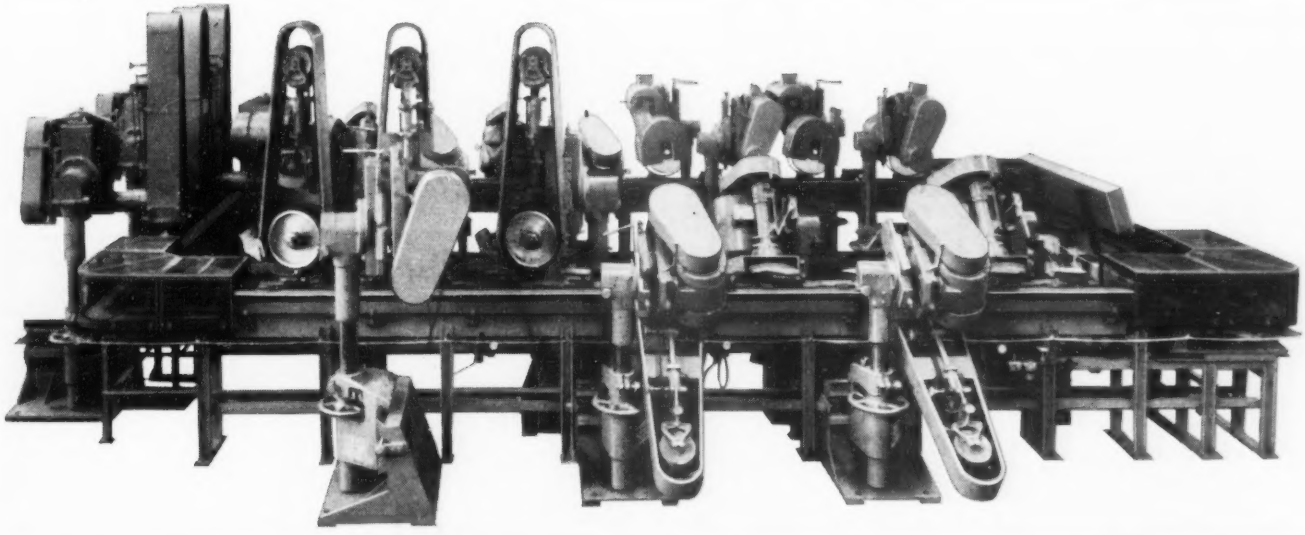
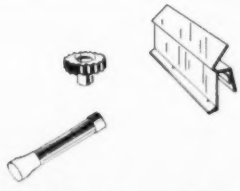
- Horizontal return type
- Open center type shown below
- Over and under chain driven type

Hammond conveyors are of machine tool construction and designed for "round-the-clock" production.

Send us prints and production requirements of your job.





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Send us one finished and several rough samples. You will receive a complete engineering report. No obligation.

If your job calls for Rotary Automatics we can offer:

- 21" turret with 3 finishing heads
- 34" turret with 4 finishing heads
- 46" turret with 5 finishing heads
- 62" turret with 6 finishing heads

Also, continuous table Rotary Automatics — Junior Automatics — Flat Finishers — Polishing and Buffing Lathes

America's widest line of Polishing, Buffing and Deburring machinery.

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BRASS ADDITIVE

— Also available JELCO COP-BRITE and BARREL NICKEL Brightener

- *Increases efficiency and throwing power*
- *Produces brighter and faster plating*
- *Allows use of higher current density*
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- *Eliminates cyanide and ammonia fumes*

Non-Critical
Boosts Production
Cuts Rejects

Can be used in standard and high speed formulations . . . still and barrel plating.

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A Proven Process . . . Used successfully by both manufacturers and job platers

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Recommended for contact surfaces of switches, wave-guide parts and other electrical applications, such as printed circuits...Can be applied in extremely heavy deposits, up to 100 milligrams per square inch.

Rhodium plating provides the advantages of whiteness, lustre and corrosion resistance of a precious metal.

***Consult** our staff, without obligation, about your specific plating problems.*

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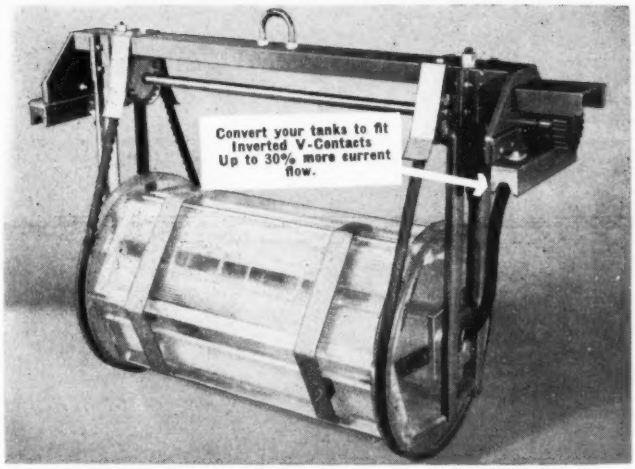
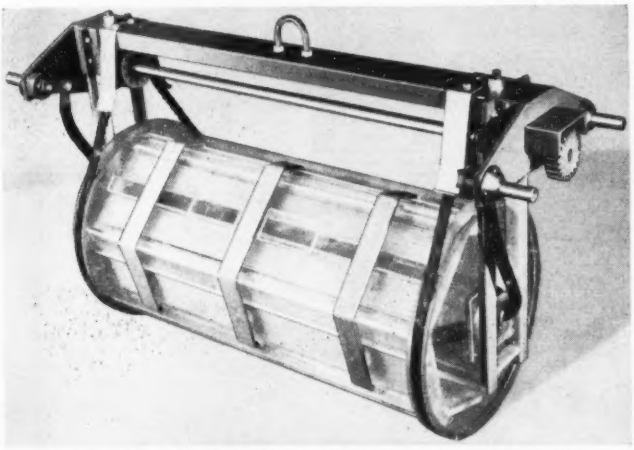
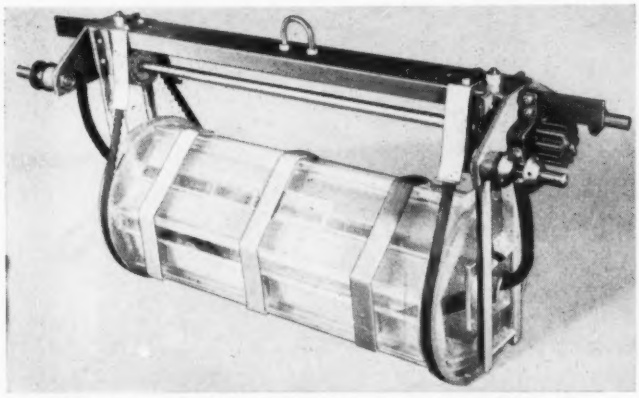


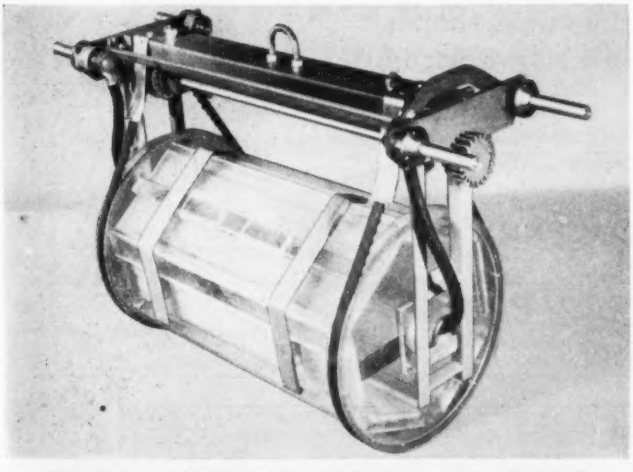
GS 14 x 36 Cylinder and Superstructure $644.50



GSU 14 x 30 Cylinder and Superstructure $598.50



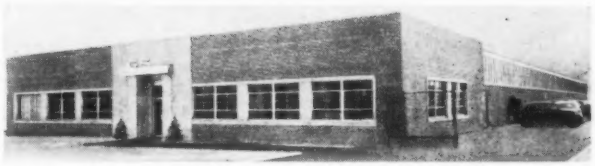
GSL 12 x 36 Cylinder and Superstructure $596.50



GSHM 12 x 28 Cylinder and Superstructure $544.50

Another reason why G. S. means Greater Savings:

LOWER PRICES



New plant – streamlined manufacturing! Standardization on G-S perfected, patented, proven design! Greater production capacity – quicker "delivery"! The result: *Lower costs!* We invite you to share in our savings. Price reductions go into effect as of *now*. Take advantage of this opportunity – a G-S Special Conversion "Package" to put *you* on the road to Greater Savings.

Special Low Prices

on G-S "H-T Sincolite" Cylinder-Superstructure Combination
Complete to Fit Your Tanks and Drives*

Model	Cylinder Dimensions	*Price F.O.B. Cleveland
GS	14 x 30 Cyl. & Superstructure	$598.50
"	14 x 36 " "	644.50
GSB	14 x 30 " "	598.50
"	14 x 36 " "	644.50
GSC	14 x 30 " "	598.50
"	14 x 36 " "	644.50
GSHM	12 x 28 " "	544.50
"	12 x 34 " "	596.50
GSHL	14 x 30 " "	598.50
"	14 x 36 " "	644.50
GSL	12 x 30 " "	544.50
"	12 x 36 " "	596.50
GSS	14 x 30 " "	598.50
"	14 x 36 " "	644.50
GSU	14 x 30 " "	598.50
"	14 x 36 " "	644.50

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Exclusive G-S Super-Performance Features

• G-S "Cogged-V-Belt" Drive (U. S. Pat. 2,562,084) • Better, Faster Plating • Less Maintenance • Heavier Loads • Floating End Plates • Automatic Positioning • Inverted V-Contacts or 3-Point Suspension (Horn-Type) • Heavier Dangler Cables • Floating Hubs • Faster Dangler Cleaning • Danglers Won't "Ride-Up" • Adjustable Bearings • Most Rugged, All-Welded "H-T Sincolite" or Tempron Cylinders • Total Cylinder Immersion.

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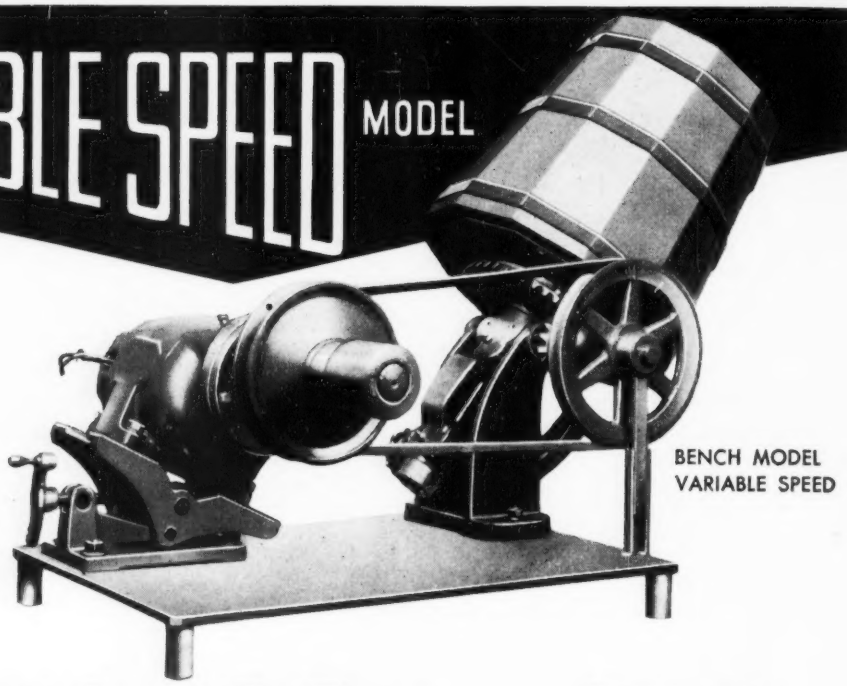
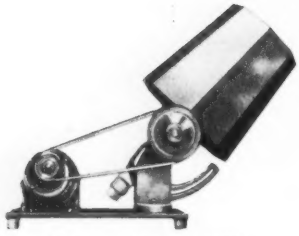


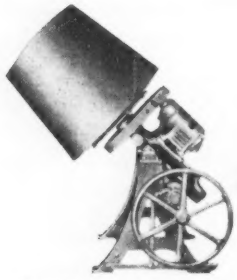
BENCH MODEL
VARIABLE SPEED



Bench-Type Single Speed

No. 5—Single Speed

No. 5A—Single Speed



No. 6—Single Speed

Note Carefully These IMPORTANT POINTS

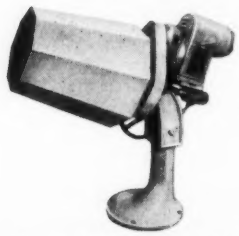
Barrels can be filled with parts or abrasive—*while running.*

Work can be watched — samples removed for inspection — *while running.*

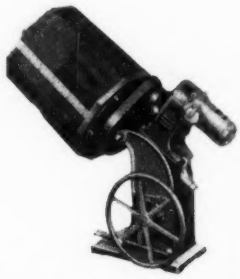
Angle can be changed for best abrasive or polishing action — *while running.*

Barrels can be emptied by tilting to pouring position — *while running.*

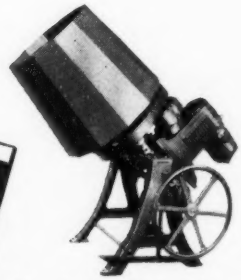
Barrels are made in various sizes, shapes, and materials. They are easily replaced.



No. 5—Variable Speed



No. 5A—Variable Speed



No. 6—Variable Speed

If You're a Tumbler, Send for This NEW CATALOG

THE HENDERSON BROS. COMPANY

"The Tumbling Barrel People"

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WATERBURY, CONNECTICUT

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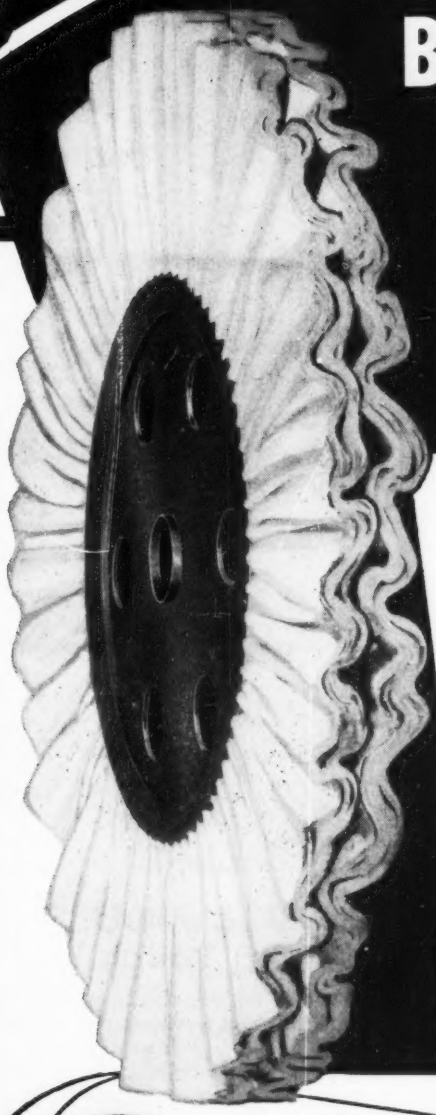
New SCHAFFNER BIAS buffs give more mileage...



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PLY _____ ARBOR _____
NORMALLY I USE _____ SECTIONS PER MONTH _____ COUNT _____
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CITY _____ ZONE _____ STATE _____

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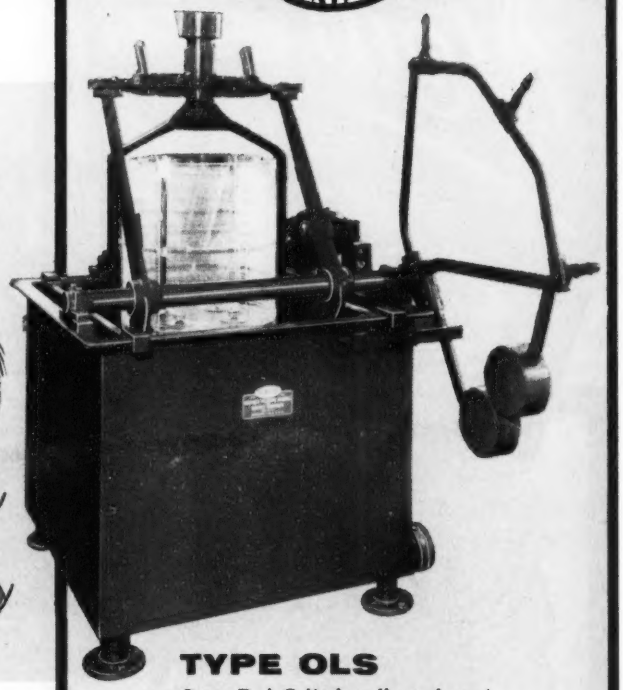

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Open End Cylinder allows free circulation of solutions. Hoists, cylinder covers and latches completely eliminated. Maximum rate of deposit.

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"To achieve a fine finish on beautiful sterling silver flatware, you start with a smooth, uniform surface," says Gorham Mfg. Co., leading silver–and goldsmiths. "To eliminate major defects in the metal before final finishing, we've found that the most efficient method is to use Paramount Felt Bobs with a mixture of fine pumice and oil. Paramount felt wheels and bobs are ideal for polishing flatware and holloware. Easily formed and having an affinity for pumice and oil, they produce a better surface than any other buff."

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*NI–PLEX®

Strips Nickel by Immersion from all common metals, INCLUDING DIE CASTINGS

*Patent Pending

NI-PLEX strips nickel from steel, copper, brass, lead, tin, silver, zinc die casting, without injury to the base metal. It also strips CADMIUM. It is the only effective and safe nickel stripper for all types of die castings and for parts containing two or more different base metals.

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NI-PLEX strips rapidly at 80°C.

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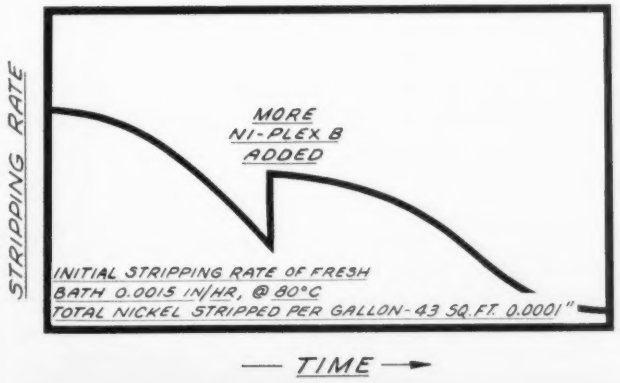
NI-PLEX is economical. Nothing is wasted. 100% efficiency. Nickel can be reclaimed.

SEND $4.00 OR PURCHASE ORDER FOR ENOUGH NI-PLEX TO MAKE UP 1-GALLON BATH


STRIPPING RATE
MORE NI-PLEX B ADDED
INITIAL STRIPPING RATE OF FRESH BATH 0.0015 IN/HR, @ 80°C
TOTAL NICKEL STRIPPED PER GALLON - 43 SQ. FT. 0.0001"
TIME

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☐ Please send us NI-PLEX literature.

Company .....

Address .....

Attn. of .....

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DIVISION OF UNITED AIRCRAFT CORPORATION

STRATFORD, CONNECTICUT

November 15, 1956

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Very truly yours,
SIKORSKY AIRCRAFT

Nelson H. Downs

Nelson H. Downs
Assistant to the
General Manager

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Division of Graver Tank & Mfg. Co., Inc.
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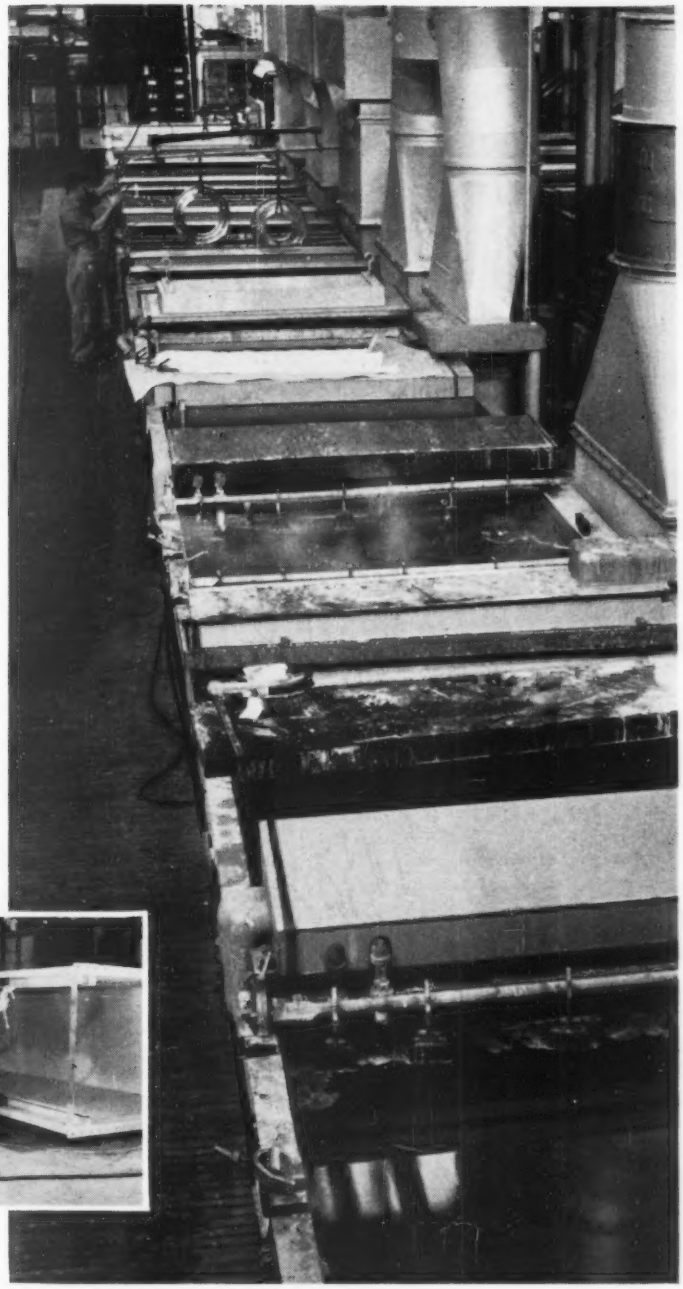
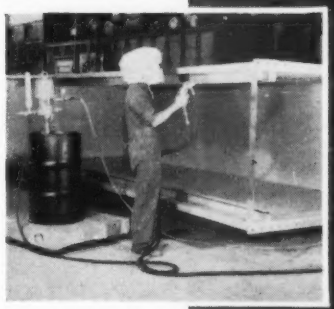
Unichrome® "Super 5300" plastisol saves tanks and money





Lined with Unichrome Plastisol, the tanks at right are a few of hundreds made fit for a wide variety of plating and cleaning operations in one plant.

Sprayable "Super 5300" builds up thick vinyl film which blocks penetration of corrosive solutions. Large tanks fabricated in sections can be coated and then bolted after lining. Plastisol coating on tank **exteriors** (easily applied during lining) ends need for subsequent painting during plant maintenance.

...sprays seamless, pore-free protective coatings thick as sheet linings

MORE AND MORE plating plants are specifying Unichrome Plastisol instead of sheet lining for their tanks. One company, in fact, now has over 1000 cleaning and metal finishing tanks not only *lined* with this remarkably durable material, but "lifetime" coated on *exteriors* as well.

Such acceptance proves that Unichrome Plastisol protection *pays* . . . that it provides a completely *reliable* lining.

Unichrome "Super 5300" Plastisol sprays films of up to 60 mils thick per coat. Multiple coats build up thick as plastic or rubber sheets, deliver more dependable protection because they conform to irregular surfaces without air pockets or seams. They also cost less to apply.

The thick plastisol films have good flexibility and abrasion resistance to absorb mechanical abuse without harm. Should the coating be damaged, even years later, it can still be patched good as new.

Unichrome Plastisol securely seals tanks against corrosion, protects solutions from contamination. An acid and alkali resisting vinyl coating, its chemical inertness makes tanks more versatile . . . interchangeable for a wide variety of work.

Unichrome Plastisols are available in black, gray, green. Firms ready to coat *your* tanks and equipment are in key locations. Ask for names, or for Bulletin SP-1.

First name in plastisols for all plating purposes

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TRERICE
Temperature Control

. . . in Plating and Metal Finishing Operations?

WHY temperature control? First of all, to assure uniform quality; second, to reduce processing costs.

Maintaining bath temperatures at the *one best level* used to be a serious problem. But not anymore. Today, TRERICE controls are automating plating processes throughout the metal finishing industry . . . maintaining precise temperatures *automatically*—TRERICE regulators prevent evaporation losses, cut down on rejects, insure uniform product quality! You save time, labor and fuel costs. Not surprising, then, that TRERICE controls are standard with leading original equipment manufacturers. Behind this wide acceptance is the TRERICE reputation for quality, and a nationwide sales and service organization.

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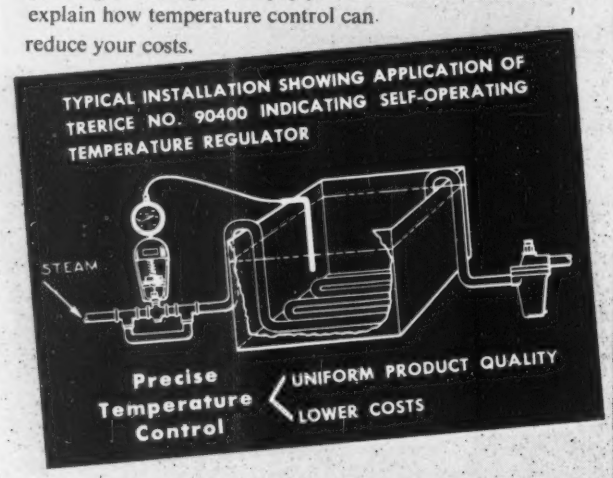
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STEAM
Precise Temperature Control
UNIFORM PRODUCT QUALITY
LOWER COSTS

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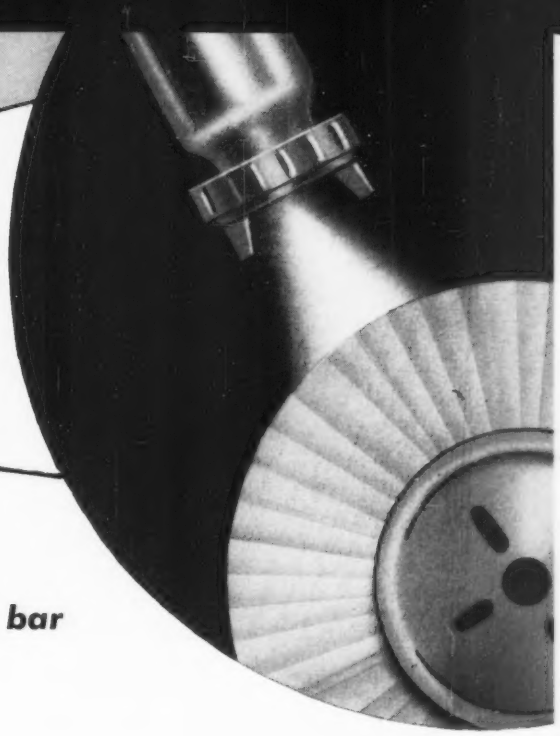

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Here's why "LIQUISPRAY" saves you money over bar compounds

- No crumbling or nubbins — all the compound goes on the wheel
- Same regulated quantity applied
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Here's what "LIQUISPRAY" can mean to you

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We invite your inquiry specifying your particular requirements. Trial samples available.

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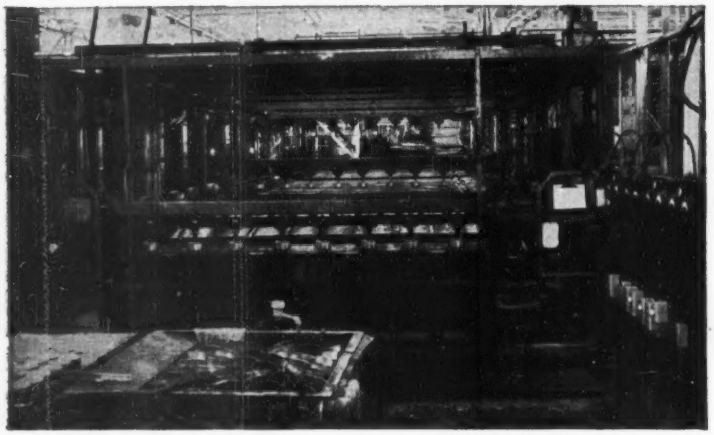
New High Standards in Plating • Processing • Cleaning



U.S. Fully Automatic Equipment for processing and heavy copper plating the bottoms of popular brand stainless steel cooking utensils. 10 such U.S. installations are in service in 3 plants of this manufacturer.

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Provides the Right Combination for More Efficient Operation

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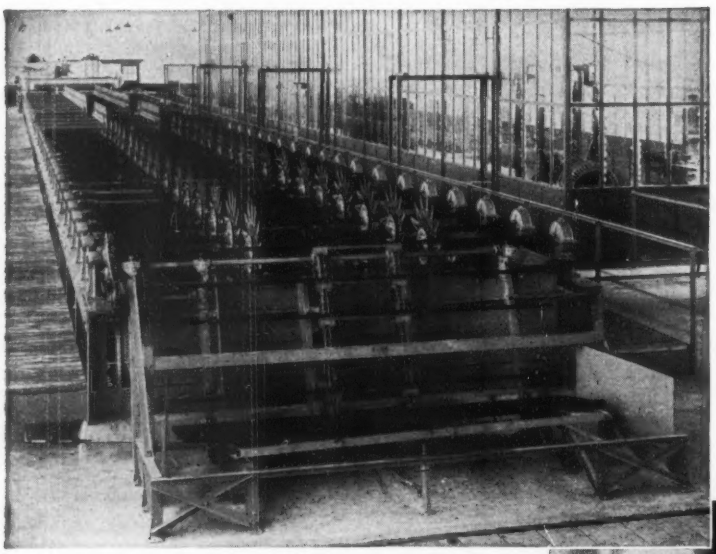

U.S. Fully Automatic Conduit Pipe Processing Installation. Performs 24 operations in one continuous cycle including cleaning, acid treatment, zinc plating pipe exterior, enamelling and baking interior surface. Capacity—over 60 million feet of pipe per year. Glass enclosure houses U.S. Generator Equipment.

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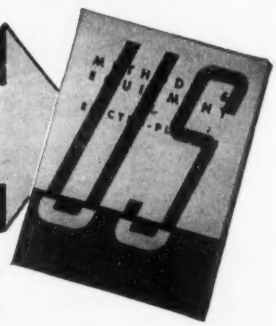

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AUGUST, 1957 Volume 55 Number 8

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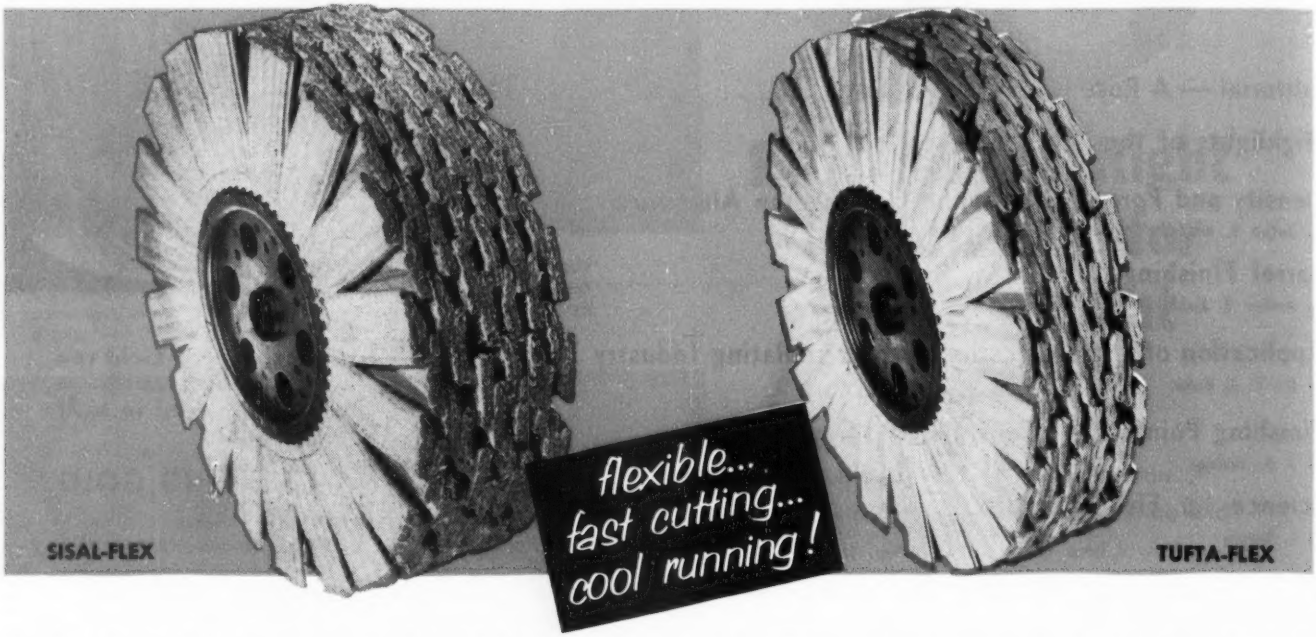

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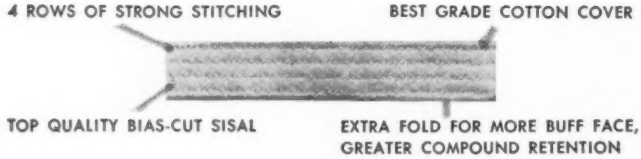
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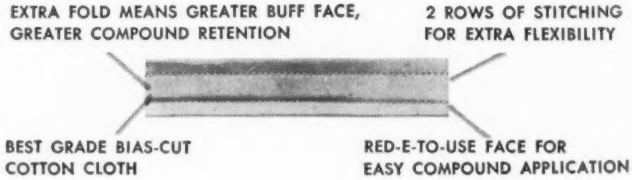
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METAL FINISHING

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ESTABLISHED 1903 VOLUME 55 • NUMBER 8 • AUGUST, 1957

A Rose Is a Rose Is a Rose

Gertrude Stein, by the mere technique of reiteration, made the whole literary world conscious of what should have been an obvious botanical verity, but scientists have been somewhat less successful in trying to convince the industrial world that an ounce is not an ounce and a gallon is not a gallon, perhaps because their presentations have been less spectacular.

Whatever the original merits of the English, or avoirdupois system, practically everyone agrees that technical progress in this day and age cries for its abandonment and for adoption of the metric system of measurement. More than a dozen years ago we commented, on this very page, about the dishearteningly slow progress being made, although just about then the National Formulary decided to emphasize the metric system for dosages, the U. S. Pharmacopeia made it the official standard, and the Council on Pharmacy and Chemistry of the American Medical Association began to use it exclusively in its publications. In the intervening years the only headway appears to have been made in the pharmaceutical and fine chemicals fields; acceptance in other industries has been practically nil. The most recent complete change-over has been by Eli Lilly & Co., who have informed their suppliers that all purchase orders, shipping containers, and billing are to be in metric weights and volumes in the future. Even the U. S. Army is adopting the metric system for artillery and small arms. Fire distance and height, and all control instruments and training devices, are to be changed to this system "with the least practicable delay."

Every plater is familiar with the advantage of the metric system, the ease of multiplying just by shifting the decimal point, the convenience of the direct relationship between weight and volume. He weighs his samples in grams, he titrates his solutions in milliliters, and he determines his wastes in parts per million, which is also metric. Then he goes back into the plating room and has to convert his grams to ounces and pounds, and his liters to gallons, using odd conversion factors and hoping there was no error in his calculations. Why? Only habit, we say!

Already in use by most nations, the metric system provides the basis for global uniformity of standards. Communications between countries and the exchange of technical information make it imperative that we all use the same standard so that the plater, for example, doesn't have to remember, when he reads a formula in a British publication, that their gallon is not the same as ours; or, when he buys precious metal salts, that they are sold by the avoirdupois as well as the troy ounce and there is a difference in cost between them. We would then be able to avoid ridiculous situations such as the specification for a karat gold bath, where pennyweights are used for the gold content to avoid confusion between avoirdupois and troy ounces, grams for the alloying metals because of the small amounts required per gallon, and ounces for the other ingredients.

Our industry stands to benefit more than others by adoption of the metric system. A steel rule marked in centimeters and meters instead of inches and feet, a bucket measuring liters instead of gallons, and a scale graduated in grams and kilograms instead of ounces and pounds — that's all it takes, and one can almost discard his slide rule. That's all it takes, of course, plus initiative!

Nathaniel Hall

HIGHLIGHTS OF THE A.E.S. CONVENTION

Francis T. Eddy
President

Dr. Andrew Wesley
Third Vice-President

Herbeth E. Head
First Vice-President

Dr. Samuel Heiman
Past President

Ralph D. Wysong
Second Vice-President

M. M. Beckwith
New President of M.F.S.A.

THE Canadian hosts did a fine job of running the Montreal Convention of the American Electroplaters' Society June 16 - 20. *G. Ross Davidson* of Canadian Hanson & Van Winkle Co., Ltd. was the general chairman to whom much of the credit belongs. While no attendance or other records were broken, those who attended remarked about their enjoyable stay in Canada, and the smoothness with which all events were handled. The registration reached 1,416 men and women.

Election of Officers

In a spirited contest for the office of third vice-president, *Dr. Andrew Wesley* of the International Nickel Co. defeated *George W. Cavanaugh* of General Electric Co. by a vote of 88-75. Other officers advanced one rung of the ladder as follows—President: *Francis T. Eddy;* First Vice President: *Herberth E. Head*; Second Vice President: *Ralph D. Wysong;* and Past President: *Dr. Samuel Heiman.*

Paper Awards

At the first business session, the AES Paper Award winners were announced by *Dr. Heiman*, AES President—The Carl E. Heussner Award to *Dr. D. Gardner Foulke* and *Dr. Otto Kardos* of Hanson-VanWinkle-Munning Co.

The George B. Hogaboom Memorial Award to *Wm. M. Tucker* and *F. O. Beuckman* of Eastman Kodak Co.

The A. E. S. Bronze Medal to *W. H. Safranak* and *G. R. Schaer of Battelle* Memorial Institute.

The Precious Metal Plating Award

to *Dr. R. E. Harr* and *A. G. Cafferty* of Western Electric Co., Inc.

The Mechanical Finishing Award to *L. H. Hopewell* of Fairchild Camera & Instrument Corp.

The Chromium Plating Award to *Dr. Vernon Lamb* and *J. P. Young* of the National Bureau of Standards.

No honorary members were elected this year.

Future Conventions

1958 - May 19 - 22, Sheraton-Gibson Hotel, Cincinnati. *Charles Wise*, Buckeye Products Co., General Chairman.

No exposition. Possible outing in the form of a river boat trip. For further information on plans for this convention, write *L. J. Howald*, Publicity Chairman, 4311 Joan Place, Cincinnati 27, Ohio. This will be the first convention to be held in May.

1959 - Detroit, with an Industrial Finishing Exposition in conjunction. *Herberth Head*, General Chairman.

1960 - Los Angeles, Hotel Statler

1961 - Boston, Hotel Statler. This was decided at the Montreal Convention. There was no opposition.

M. F. S. A. Activities

The Metal Finishing Suppliers' Association held a streamlined business meeting on Monday, June 17th, with 152 in attendance. President *Joseph Duffy* of the Pennsalt Chemicals Corp. presided. Preliminary business had previously been taken care of by their Board of Trustees on Sunday and by committees during the year. Newly elected officers and their company affiliations are — President: *M. M. Beckwith*, Harshaw Chemical Co.; 1st Vice President: *E. W. Couch*, Lea Mfg. Co.; 2nd Vice President: *Ray Ledford*, Industrial Filter and Pump Mfg. Co.; 3rd Vice President: *Fred Green*, Crown Rheostat and Supply Co.; Executive Secretary: *A. P. Munning*, Munning & Munning, Inc.; Treasurer: *Tom Trumbour*, Metal Finishing magazine; and Trustees: *L. J. Minbiole*, Udylite Corp.; *Thomas Gill*, G. S. Equipment Co.; *Charles Helmle*, Enthone, Inc., and *Robert Norton*, Hanson - Van-Winkle-Munning Co. The Detroit exhibit in 1959 was commented on briefly by *Howard McAleer*, Formax Co. A majority opinion favored a four-day show opening on a Tuesday. Unfortunately, the new exhibit and convention hall now under construction will not be ready in time so that this Industrial Finishing Exposition will take place at the Fair grounds, Woodward Ave. and Eight Mile Road. *Bill Young* of Cincinnati was appointed in charge of arrangements for MFSA activities at the 1958 A. E. S. convention in that city, and he announced that entertaining suites in the headquarters hotel would be reserved on a first-come-first-served basis.

Top Paper Award Winners with their plaques. Left to right Dr. R. E. Harr, Dr. V. Lamp, G. R. Schaer, W. H. Safranek, W. M. Tucker, F. O. Bueckman, Dr. D. G. Foulke, Dr. O. Kardos.

Later that day MFSA "Open House" was attended by a capacity crowd using both of the Mount Royal ballrooms. *Bob Burford* managed the MFSA Golf Tournament played at the St. Hyacinth Golf Club, in which 77 conventioneers participated. Low gross winners were *Harold Marsh* and *Augustine Manganella*, tied at 72. Low net (Calloway System) winners were—1st, *Bruno Leonelli* 67; 2nd, *Harold Baker* 70, 3rd, *John Gumm* 71; and 4th, tie between *Frank Griggs*, *Bill Inness* and *George Westerberg* 72.

Acknowledgment

Grateful acknowledgment is made to *Richard V. Morrison*, *Howard A. Gauvain* and *Miss Mildred G. Gleason*, editors of the H-VW-M Official Convention News for use of photographs in this article.

A. P. Munning, Executive Secretary of the Metal Finishing Suppliers' Association, presents Government Bonds to the lucky winners at MFSA "Open House."

Chairman G. Ross Davidson calling the 44th Convention to order. From left to right: Mr. Davidson, P. M. Coady, educational chairman; Mrs. G. Ross Davidson, ladies' chairman; Dr. Samuel Heiman, President; Francis T. Eddy, President Elect, and John P. Nichols, Executive Secretary of the A.E.S.

Franklin J. MacStoker, former A.E.S. President, raises a question during the first business session.

Electroplaters on a plant visitation to Canadair Limited. Saw construction of Sabre VI jet fighters.

(Photo Courtesy Canadair Ltd.)

Platers getting ready to board buses for return trip to Convention headquarters after plant visitation.

(Photo Courtesy Canadair Ltd.)

A group of lady Conventioneers embarking on the excursion to St. Helen's Island.

A.E.S. Editorial Board in Session at Montreal.

Technical Sessions in the Champlain Room of the Sheraton-Mount Royal were well attended.

Dr. William Blum, Mrs. W. L. Pinner, W. L. Pinner, Andrew Wesley, Donald Foulke, Mrs. Francis T. Eddy, Francis T. Eddy.

Speakers' table at the MFSA Luncheon. From left to right: Manson Glover, legal advisor; Robert M. Norton, Hanson-Van Winkle-Munning; George A. Stutz, The Stutz Company; Ezra Blount, Products Finishing; Bill Young, Cincinnati chairman; Edward Huenerforth, Crown Rheostat & Supply Co.; Earl W. Couch, Lea Mfg. Co.; Ray Ledford, Industrial Filter & Pump Mfg. Co.; M. M. Beckwith, The Harshaw Chemical Co.; A. P. Munning, Munning & Munning, Inc.; Joseph J. Duffy, Pennsalt Chemicals Corp.; Francis T. Eddy, first vice-president, American Electroplaters' Society; Thomas A. Trumbour, Metal Finishing magazine; J. J. Carrique, Alloycraft, Ltd.; Sherman Goble, Federated Metals Division, American Smelting & Refining Co.; Hugh MacLeese, Metal & Thermit Corp.; Douglas MacDermid, W. D. MacDermid Equipment & Supply Co.; Fred Green, Crown Rheostat & Supply Co.

One of the tables at the MFSA business meeting. From left to right: Bill Tredwell, Maas & Waldstein; Arthur Collins, M. E. Baker Co.; Palmer H. Langdon, Metal Finishing magazine; Edward Bruck, Platers Supply Co.; Gerald Lux, Oakite Products, Inc.; Martin Maher, Oakite Products, Inc.; Rudy Hazucha, The Clinton Co.; John E. Trumbour, Metal Finishing magazine; Jack Malool, Egyptian Lacquer Co.

NAMF Activities

The NAMF program featured a day-long business meeting, management seminar, reception and traditional banquet with arrangements under the direction of general program chairman *Harold W. Baker*, Electro Galvanizing Co., Chicago.

Eight out of 14 members of the 1957-58 board of directors were re-elected. These were *John Palik, Jr.*, National Plating Corp., Cleveland, president for the third consecutive term; *Webster B. Knight*, Knight Plating Co., Detroit, 2nd vice president; *Harold W. Baker*, Electro Galvanizing Co., Chicago, 1st vice president; *Frank Kaiser*, Long Island Mechanical Plating Co., Woodside, L. I., N. Y., secretary-treasurer; *Sal Novelli*, Service Plating Co., Brooklyn, N. Y., assistant secretary-treasurer; and directors *Philip Ritzenthaler*, Plating Engineering Co., West Allis, Wisconsin; *Henry J. Siegel*, Siegel-Robert Plating Co., St. Louis Mo.; *Mariano Ranno*, Imperial Plating Co., Brooklyn, N. Y., *Joseph Eisenberg*, Almag Chemical Corp., Baltimore, Md.

Newcomers elected to the board of directors include *Harold E. Coombes*, Crown City Plating Co., Pasadena, Calif.; *George W. Taylor*, Production Plating Co., Adel Ga.; *Edward Fell*, Atlas Plating Works, Cicero, Ill.; *Ernest D. Callahan*, F. M. Callahan & Son, Inc., Malden, Mass.; and *Curtis M. Varland*, Varland Metal Service, Inc., Cincinnati, Ohio.

Following his reelection, president Palik made the following appointments: Constitutional Revisions, *J. Robert Greenwell*, Reliable Plating Co., Chicago; Standards and Definitions, *Philip Ritzenthaler;* Strategic Materials Committee, *Mariano Ranno;;* Education, *Henry J. Siegel*; Parliamentarian, Atty. *G. David Zeils, Jr.*, Ashman and Zeile, Cleveland.

Wilson Loveless, Varland Metal Service, Inc., Cincinnati, was named 1958 program chairman by Palik.

Alfred Marinaro, Platers' Research, Inc., New York, close friend and business associate of *Silvio C. Taormina*, delivered a fitting eulogy to the deceased champion of the job plater which was made part of the record of the 1957 NAMF convention proceedings. Members stood in silent tribute following the presentation. An obituary of Mr. Taormina appears elsewhere in this issue.

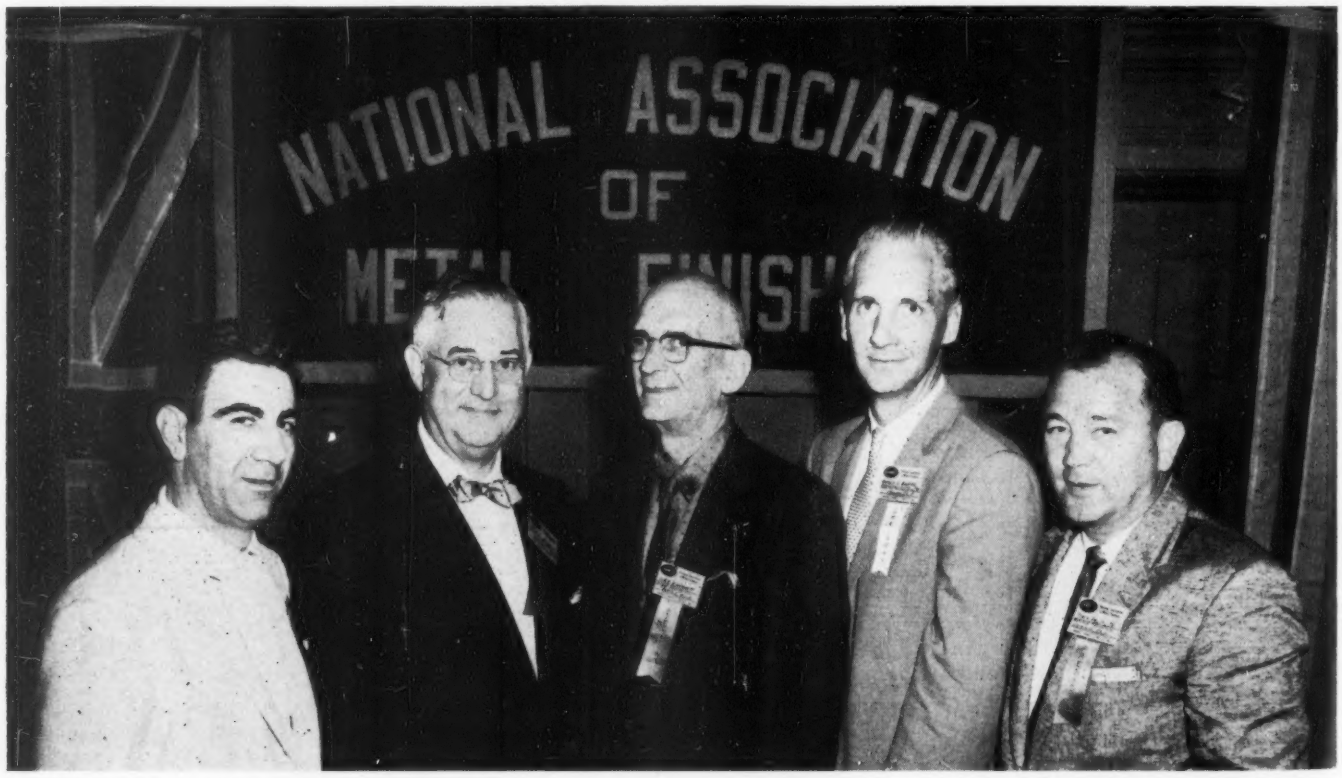
The 8-hour business session saw the enactment of legislation permitting membership to firms outside of the U. S., the creation of the post of past president, change in disbursement procedures, and the presentation of reports from various officers and committeemen.

Highlight of the program was a give-and-take discussion by panelists representing a cross section of U. S. job platers. Described by many as "one of the most illuminating and interesting educational sessions ever to have been presented", the seminar was under the capable aegis of *A. T. Leonard*, the moderator, Superior Plating, Inc., Minneapolis, Minn. Topic was "Determining the Cost of Certain Still, Decorative and Barrel Plating Jobs."

Panelists included *Mariano Ranno*, Brooklyn; *Henry J. Siegel*, St. Louis, *L. T. Briggs, Jr.*, Erie, Pa., *Lawrence J. Hay*, Chicago; *Glenn H. Friedt, Jr.*, Detroit.

A reception and banquet concluded the 1957 NAMF program with *A. C. Wilkinson*, sales promotion manager, Electrolux of Canada, Ltd., delivering the main address.

Honored guests at the reception and banquet included *Dr. and Mrs. Samuel Heiman*, American Electroplaters' Society; *Mr. and Mrs. Joseph J. Duffy, Jr.*, Metal Finishing Suppliers' Association; and *Mr. and Mrs. G. Ross Davidson*, Montreal A. E. S. Convention committee chairman.



Newly elected officers of the NAMF. From left to right: Sal Novelli, Service Plating Co., Brooklyn; Frank Kaiser, Long Island Mechanical Plating Co., Woodside, L. I., N. Y.; Webster B. Knight, Knight Plating Co., Detroit; Harold W. Baker, Electro Galvanizing Co., Chicago; John Palik, Jr., National Plating Corp., Cleveland.

Density and Porosity of Anodic Coatings on Aluminum

By Ralph B. Mason, *Alcoa Research Laboratories, New Kensington, Pa.*

Abstract

Toluene has been selected as the liquid to use in applying Archimedes' principle to the determination of the real density of unsealed and water sealed anodic coatings on aluminum. Density values were used to calculate the per cent pore volume. Unsealed sulfuric acid anodic coatings on 1100-H16 aluminum, prepared under standard conditions, had a density of 2.96 and a pore volume of 15.8%; the corresponding water sealed coatings had a density of 2.65. Similar coatings on 2024-T3 aluminum have lower densities but higher pore volumes, namely about 47%.

Anodic coatings on 1100-H16 and 2024-T3 aluminum prepared in the more common electrolytes were investigated. There was little change in the density of coatings prepared in the oxalic acid electrolyte with rise in temperature, and the porosity increased only slightly.

Introduction

MOST investigators have been satisfied to determine the apparent density of anodic coatings on aluminum by measuring the thickness with the microscope and calculating the density from the apparent volume and the weight of coating. Such a procedure is satisfactory for a sealed oxide coating where the apparent and real density should be practically the same but, with an unsealed coating, the apparent density is usually much lower than the real density.[1, 2] The air filled pores of the unsealed coating account for its low apparent density.

Measurements on the amount of water,[3] dye solution[4] or light oil[5] sorbed by an unsealed oxide coating have been used to estimate the porosity. Fischer & Kurz[6] have estimated from the electron microscope pictures that the pore volume of a sulfuric acid anodic coating is about 13.4%. Using an improved technique with electron miscroscope data, Keller, Hunter and Robinson[7] have investigated the pore structure of oxide coatings formed in several electrolytes and have calculated what the pore volumes of these coatings would be if there were no solvent action along pore walls. Using the data of Burwell, Smudski & Mays,[8] who employed the monomolecular nitrogen method for determining the roughness of sulfuric anodic coatings on aluminum, the pore volume can also be calculated from the break in the sorption curve when the pores are completely filled with nitrogen. The porosity value obtained by this method is about 14%. Recently, Cosgrove[9] found that n-butane was a satisfactory medium for determining pore volume by sorption techniques, but that krypton was not satisfactory because of its unusual behavior with coatings having large pores.

Using the suspension method in high density iodide solutions[10] it was found that the specific gravity of a film produced in a boric acid-borax bath was 3.10 ± 0.05. Apparently the best practical method recorded in the literature for determining the density of sealed and unsealed sulfuric anodic coatings on aluminum consists in applying the Archimedes principle and using a hydrostatic balance and carbon tetrachloride as the suspension medium.[11, 12]

The apparent density values for anodic coatings on aluminum reported by Elze[13] and Lenz[14] appear to be rather erratic. Apparent density values are dependent on thickness measurements which are not too exact for the thinner coatings. It is not possible to extrapolate results of this nature to zero time and obtain the true density of anodic coatings.

Reliable density values of anodic coatings on aluminum as well as porosity values of unsealed coatings can be obtained by weighing the coated specimens on a sensitive analytical balance, first in air and then in toluene. The loss in weight in the toluene can be converted into the actual volume of the coating. The difference between the volume of the unsealed coating and the sealed coating will give the pore volume, while the density values are calculated from the weight and actual volume of the oxide coating.

General Procedure

Unless otherwise indicated, 5.1 cm × 7.6 cm × 1.6 mm (2″ × 3″ × 0.064″) 1100-H16 aluminum panels were cleaned by anodic treatment in sulfuric acid, stripped in phosphoric-chromic acid and then anodically coated for 30 minutes in 15% sulfuric acid at 21.1°C. (70°F.) with a c.d. of 1.3 amp./dm.^{2} (12 amp./ft.^{2}). After washing in water they were dried with an air blast to constant weight and stored in a desiccator over concentrated sulfuric acid. To follow the changes that take place on sealing an anodic coating on aluminum, density and volume measurements were made. Since sealing plugs the pores of an anodic coating, the actual volume of a sealed coating will be

greater than the volume of an unsealed coating by an amount equal to the volume of the pores. In most cases the volume of the sealed coatings was determined before and after the removal of the smudge which was developed by sealing in boiling distilled water. When volumes are used to calculate the porosity it is not necessary to completely seal the coating. It is only necessary to plug the outer openings of the pores so that toluene cannot enter. When density values are used to calculate porosity it is essential that the coating be completely sealed.

To determine the density and volume of a sample, it is simply weighed in air and toluene. The density and volume of the unsealed and sealed coating should be determined on the same sample. At the completion of an experiment, the anodic film can be stripped off, the volume and weight of the basis metal determined and, by difference the weight, volume and density of the anodic film obtained for various stages of treatment. The anodic film was stripped off without attack on the base metal in a hot phosphoric-chromic acid solution.[15]

Preliminary experiments indicated that it would be necessary (1) to correct all weights to vacuo, (2) to read the temperature of the toluene to 0.1°C, (3) to correct for a surface tension effect on the aluminum wire used to suspend the sample in the toluene and (4) to correct volume calculations to a standard temperature such as 25°C. The latter correction was necessary because the weighings in toluene were done at room temperature, and this temperature fluctuated considerably.

Water could be used conveniently as the suspension medium except for the difficulty encountered in making the correction for the high surface tension effect on the suspending wire and the possibility of chemical reaction between the coating and liquid. Methyl alcohol and carbon tetrachloride were tried and found to evaporate too rapidly, causing a cooling effect on the liquid. The volume measurements were not changed by boiling the unsealed specimens in toluene or by evacuating the system. It has been assumed that the toluene is capable of penetrating all pores which are susceptible to sealing by boiling water. After considering all factors it was concluded that toluene was the best suspension medium for general testing.

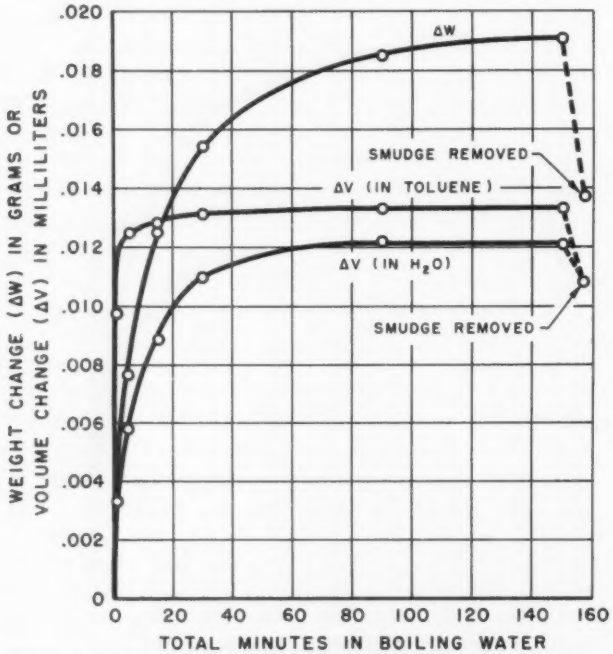


Figure 1. Volume and weight changes of anodic coating on immersion in boiling water. Specimen of 1100 aluminum, 5.1 cm x 7.6 cm, anodically coated in 15% sulfuric acid for 30 minutes at 21.1°C.

Experimental Results

The preliminary results obtained with water and toluene as the suspension mediums are shown in Figure 1. A specimen of 1100-H16 aluminum, 5.1 cm x 7.6 cm x 1.6 mm (2″ x 3″ x 0.064″), was cleaned and then oxide coated for 30 minutes at 1.3 amp/dm^2 (12 amp/ft^2) in 15% H_2SO_4 at 21.1°C (70°F). The sample was then sealed for various lengths of time and the change in weight and actual volume were determined. The volumes obtained by the toluene method are slightly greater than those determined in water and the maximum is obtained after about 10 minutes sealing time in contrast to the rather gradual increase in volume up to about 30 minutes sealing time when the measurement is made in water. The unsealed volumes and the sealed volumes after smudge removal are the same whether determined in water or toluene. The non-penetration of the toluene into the fine pores of the smudge indicates why better results are obtained when the smudge is removed before determining the volume of the sealed coating.

The loose smudge formed on sealing the sulfuric acid anodic coating in water has been shown to consist of aluminum monohydrate ($Al_2O_3.H_2O$). The coating itself contains Al_2O_3 and about 13-15% SO_3 ($Al_2O_3 \cdot XSO_3$). On sealing the coating in boiling water the outer surface is hydrolyzed and the sulfate is lost to the sealing water. The H_2O gained by forming monohydrate in the smudge is approximately equal to the SO_3 lost. The smudge is easily removed from the oxide surface with a moist pad and a mild abrasive such as silica.

In determining the per cent porosity of a coating, the difference in volume of a sealed and unsealed coating is divided by the volume of the sealed coating. Since the volumes of the coating are determined in toluene, the smudge should be removed from the sealed coating. Some correction could be made for the removed smudge, but this is impractical. The density values of the sealed and unsealed coatings are accurate, however, and the porosity can be calculated from these values.

If d = the density of the unsealed coating
d_2 = the density of the sealed coating
and d_3 = the density of the water in the pores
Let X = fraction of coating of density d
and 1-X = fraction of coating of density d_3 ($d_3 = 1$)

Then $Xd + (1\text{-}X) \cdot d_3 = d_2$

The percent porosity of the unsealed coating will be (1-X) 100.

A series of 1100-H16 aluminum panels was cleaned and anodically coated in 15% sulfuric acid at 21.1°C

TABLE I

Variation of Density and Porosity With Time of Anodizing

Samples*	Time Anodized	Sealed** Minutes	Density Sealed	Density Unsealed	% Pore Vol.
4	2 sec.	5	—	—	—
4	5 sec.	5	—	—	—
4	15 sec.	5	2.91	—	—
4	30 sec.	5	2.63	—	—
2	1-¼ min.	5	2.74	2.53	12
2	2 min.	5	3.00	2.73	14
1	15 min.	15	2.95	2.63	16
1	30 min.	30	2.96	2.65	16

*5.1 cm x 7.6 cm (2" x 3")
**Boiling distilled water

(70°F), using a current density of 1.3 amp/dm² (12 amp/ft²). The time of coating varied from 2 seconds to 60 minutes. The density of the unsealed coatings was determined and, after sealing in water and removing smudge, the density of the coatings was again determined and the per cent porosity calculated. The results are shown in Table I.

The results on the short time unsealed coatings are not very accurate because of the small volumes and weights involved. No determinations were possible for the short time sealed coatings because they chalked away completely when polished with a mild abrasive. Little difference is noted between the 15 and 30 minute coatings, as might be expected. In order to determine the effect of the temperature of the anodizing bath a series of panels was oxide coated for 30 minutes in 15% sulfuric acid at 1.3 amp/dm² (12 amp/ft²) at temperatures varying from 10° to 32.2°C (50° to 90°F). The results recorded in Table II show that the actual density of the unsealed coating is only slightly affected by the temperature of the sulfuric acid bath. However, the porosity of the oxide coating increases rapidly with a rise in temperature of the anodizing bath and, as a consequence, the density of the sealed coating also decreases.

Another series of 1100-H16 aluminum panels was treated in several common electrolytes under standard conditions for 30 minutes and density and porosity

TABLE II

The Effect of Anodizing Temperatures on Density and Porosity of Anodic Coatings

Temp. of Bath		Density Unsealed	Density Sealed	% Pore Volume
10.0	50	2.95	2.74	10.8
15.6	60	2.95	2.71	12.3
21.1	70	2.96	2.65	15.8
26.7	80	2.93	2.56	19.2
32.2	90	2.92	2.36	29.2

values were determined and the results are shown in Table III.

The density and porosity values for coatings formed in 15% sulfuric acid at 21.1°C (70°F) are practically the same as those formed in 7% sulfuric acid at

TABLE III

Density and Porosity of Anodic Coatings Made in Various Electrolytes

Electrolyte	Temperature °F	Temperature °C	Density Unsealed	Density Sealed	% pore Volume
15% H_2SO_4	70	21.1	2.96	2.65	15.8
	80	26.7	2.93	2.56	19.2
7% H_2SO_4	70	21.1	2.97	2.70	13.7
	80	26.7	2.95	2.65	15.4
9% $(COOH)_2 2H_2O$	70	21.1	2.89	2.68	11.2
	80	26.7	2.91	2.68	12.0
20% $NaHSO_4$*	91	32.8	3.00	2.58	21.0
8% CrO_3**	95	35.0	3.14	2.71	20.0

*Coated for 20 minutes at a c. d. of 0.65 amp/dm² (6 amp/ft²)
**Coated for 30 minutes at 40 volts.

26.7°C (80°F). Higher temperature and concentration favor the formation of more porous coatings in the sulfuric acid electrolyte. The temperature of the oxalic acid electrolyte on the other hand has only a slight effect on the porosity of the coating. The porosity of coatings formed in sodium acid sulfate and chromic acid electrolytes was high because of the higher temperature of the baths. The density of the unsealed coating for these 2 electrolytes was characteristically high.

Density and porosity values were obtained for anodic oxide coatings formed on 2024-T3 aluminum in 15% sulfuric acid and 8% chromic acid. In Table IV it will be noted that the density values for 2024-T3 aluminum coated in sulfuric acid were low and the porosity was high. It is apparent why it is easy to dye an anodic coating on 2024-T3 aluminum a deep color such as black. The density and porosity values obtained for the anodic coatings formed in chromic acid on 2024-T3 aluminum are only approximately correct although the values in Table IV are the average of a larger number of determinations than were usually used. The chromic acid anodic coatings on 2024-T3 aluminum are excessively distintegrated by water in the sealing step.

TABLE IV

Density and Porosity of Anodic Coatings on 2024-T3 Aluminum

Electrolyte	Density Unsealed	Density Sealed	% Pore Volume
15% H_2SO_4*	2.84	1.97	47.3
8+% CrO_3**	2.95	2.29	33.9

*Specimens coated for 30 minutes at 21.1°C (70°F) with a current density of 1.3 amp/dm² (12 amp/ft²).
**Specimens coated for 30 minutes at 35°C (95°F) using a potential of 40 volts.

Summary

The real density of unsealed and water sealed anodic coatings on 1100-H16 aluminum have been determined

(*Continued on page 67*)

BARREL FINISHING

By Arthur S. Kohler, *Frederick Gumm Chem. Co., Inc., Kearny, N. J.*

A previous article on the fundamentals of ball burnishing, published in the July 1956 issue of METAL FINISHING, received such favorable comments that the author was prevailed upon to expand his treatment of the subject to cover all phases of barrel finishing, the first part of which appears here. — *Ed.*

BARREL finishing has been practiced for many decades in isolated instances and in a few industries, such as the jewelry trade, but did not attain general acceptance until recent years. World War II gave great impetus to the growth of this type of processing, due to the general labor shortage and the need for dependable volume production. Today, there are few plants manufacturing small parts which do not employ some barrel tumbling. In some of the large industries where small parts are required (typewriters, sewing machines) tumbling departments employing a hundred or more barrels are quite common.

The tumbling barrel is a tool just as much as a drill press or a grinding wheel and, as is true of all tools, it has its outstanding points and its drawbacks. It is neither a universal cure-all nor a child's toy. Barrel tumbling requires intelligent thought in devising the various procedures employed and in supervision of the operators. Each job should be considered as an individual problem since the initial surface conditions, burrs, shape, etc., vary from job to job, and the final color, luster, radius requirements, etc., vary so greatly from part to part. To meet this multitude of requirements, various sizes and types of barrels, tumbling media, and a number of compounds have been developed by various tumbling supply companies. Many of these companies maintain pilot laboratories which continually study tumbling problems and process sample parts for customers. In addition, many of these suppliers maintain trained field engineers who are available for consultation and who will assist in setting up a tumbling department and help to start the production of the first loads. At the present time, practically all development in this field is being carried on by the suppliers and many of the materials used are of a proprietary nature.

One of the first questions asked an expert is "Can you tumble this?" The answer is generally "yes" because almost anything that can be gotten into a barrel can be tumbled. However, the question should be, "Can tumbling give me a satisfactory product and do it cheaper than any other method?" If it can be shown that such is really the case, then the use of the barrel is advisable. In other words, barrel finishing should be used where it is most economical. Consequently, it has been found in some cases that the entire job can be done best entirely in the barrel, in others it may be used in conjunction with belt grinding or with wheel buffing. Sometimes, particularly in the case of castings, a whole series of steps may be necessary, as follows:

1. Wheel grinding to remove parting lines and sprues.
2. Barrel tumbling to remove surface roughness, break radii.
3. Color buffing with a wheel to produce the final luster.

On the other hand, many brass castings merely may be ball-burnished to remove excessive sharpness and to produce an attractive brilliant color. Which process or combination of methods may be required depends entirely on the final results desired from a given raw material. So, the prospective user should not be discouraged if the consultant recommends a combination of mechanical operations instead of the exclusive use of the barrel.

Barrel finishing may be conducted either as a dry method, or the work may be mixed with a liquid to improve the results. In the plastics field dry tumbling is used almost exclusively because of the light nature of the work, but this method is used only to a very slight degree with metal parts and this article will cover the most generally used "wet" methods. Some of the earlier methods used consisted of tumbling metal parts with oil and silica and, later, soluble oil and silica were also used. Unfortunately, the removal of the oil residues presented problems and, while soluble oil showed promise, it sometimes happened that a batch of work set to mass-like concrete. Because of low cost and the ease of cleaning the finished parts, water is used today almost exclusively as the liquid in the tumbling barrel.

Elements of Barrel Operation

Present practice requires 4 or 5 items, namely, a barrel, the work to be processed, water, a compound and, in many, but not all instances a tumbling medium. Generally, it may be said that the compound and medium used determine the type of result obtained. Before considering these ingredients individually, it is well to consider what takes place during the tumbling operation. Fig. 1 shows a side view of a barrel which is loaded to 50% to 60% of the barrel capacity,

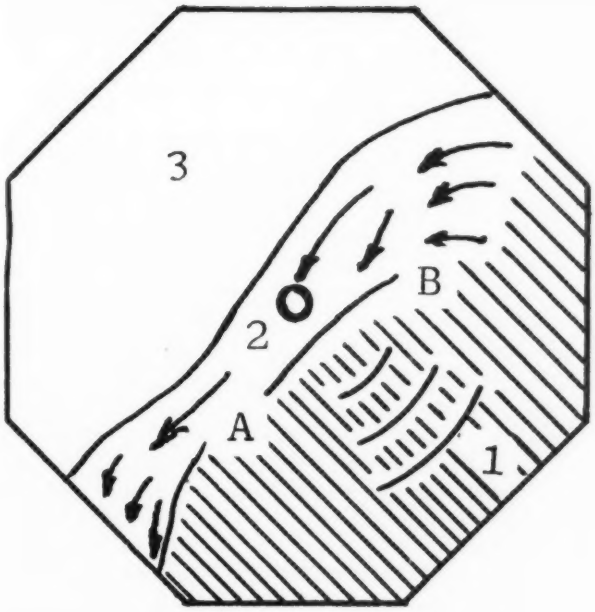


Figure 1. The flow action in a barrel.

which is about the way most jobs are handled. In the first place, in order to have a smooth-flowing load, it is necessary that the material being tumbled be moderately small in size, compared to the barrel size, and the particles being tumbled should be, as nearly as possible, spherical or cubic, in order to have a steady action. Naturally, this cannot be the case with many pieces, since some are long and thin, and others are of irregular shape. To help overcome this size or shape handicap, the work load may be mixed with particles which are small in size and, roughly, approximately spherical. These particles are called a medium. If the medium constitutes a reasonably large proportion of the load, it will be found that its flow characteristics control the barrel action and the entire load behaves almost the same way as the medium alone would act.

As shown in Fig. 1, there are three main zones in the barrel when it is in operation. The upper part of the barrel, Zone 3, is empty when operated at the usual speed, (10-45 rpm). In Zone 2a constant landslide type of action takes place during the period of operation. As fast as the downsliding particles come to rest at or near the bottom of Zone 2, they are covered by the next particles and then travel almost as a rigid mass concentrically with the barrel in Zone 1 until they reach the point where they reach Zone 2 again, and again go through the landslide of Zone 2. This landslide effect of Zone 2 is what keeps the work well mixed thoughout the load, and it is generally believed that the bulk of the grinding or polishing action takes place in Zone 2 because of the rubbing of piece against piece with rapid motion. Actually, there is some movement of the mass in Zone 1 due to the constant change of the center of gravity as the particles consolidate. Furthermore, there is considerable pressure of particle against particle in this zone, so that the heavy pressure with slight movement also contributes to the general results.

It might be noted here that maximum grinding action would seemingly take place along line A-B because here the maximum difference of particle speed is to be found, since particles that are moving rapidly transverse of the barrel come in contact with those moving concentrically. Also, since these pieces sliding down help to carry the weight of those above them, they should exert a reasonable pressure. The combination of both pressure and movement should give the maximum grinding action. As a matter of fact, it is found in unlined barrels or wood-lined barrels that the barrel wall wears away most rapidly in the region indicated by A-B if rotated around the barrel.

It should be noted here that, if the work pieces (e.g. A, Fig. 2) are longer than the thickness of Zone 2, it would be reasonable to expect that some of these would project from Zone 2 and one might expect that the pieces would be somewhat damaged due to nicking between pieces. Furthermore, if the pieces are fairly long, some of them (B, Fig. 2) will, at times, project from Zone 1 into Zone 2, where they are momentarily exposed to bombardment by the particles of Zone 2. When this occurs, it will be found that the ends which project tend to become mushroomed as though struck by repeated hammer blows. In view of these undesirable effects on large pieces, an old rule of thumb says that "the major dimension in free tumbling work should not exceed one-third the diameter of the barrel." This is probably a generous figure and, in most cases, one-quarter the diameter would be a better maximum value.

The speed of rotation of the barrel determines the location of Zone 2. At extremely low speeds the load is lifted to a certain point when a thin line of Zone 2 forms and there is a sluggish belt of particles that slides downward. At higher speeds the angle with the horizontal position increases and the sliding rate becomes much more rapid and the zone increases in thickness also. At speeds of about 100 rpm, the zone disappears and some particles are carried around the

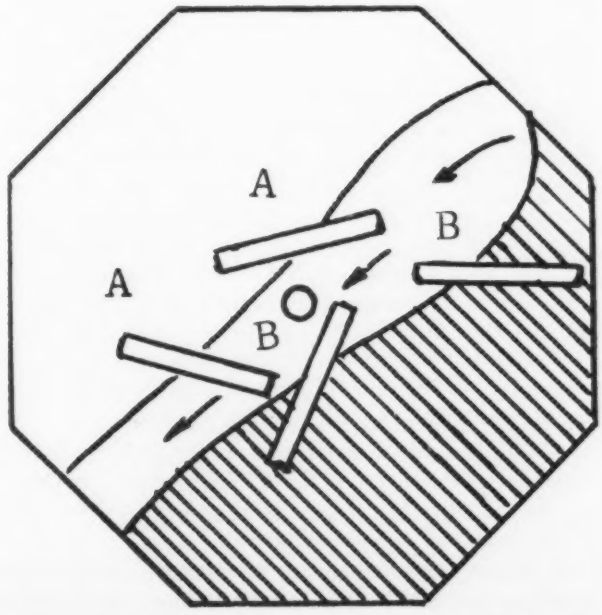


Figure 2. Adverse effect on parts too large for the barrel.

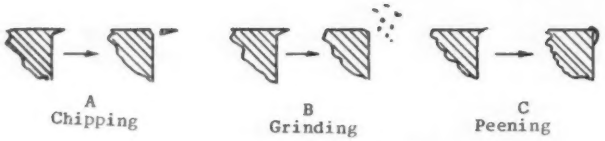


Figure 3. The effect of the three basic actions on a burr.

barrel without sliding, due to centrifugal force. In actual operation, small diameter barrels may operate at speeds of 40-45 rpm, and large barrels at 10-20 rpm, so that centrifugal force is not a factor in barrel finishing.

The rigidity of the load depends on the shape and size of the particles being tumbled. Irregular shapes and large pieces form a more rigid and less fluid mass. When the mass is fluid, there is a cushioning action between pieces and, consequently, there are less violent impacts between work pieces, and less damage due to nicking or peening. Furthermore, smaller pieces, being individually lighter in weight, strike against surfaces with less impact and cause less damage to the work. However, with less energy per particle, the work of grinding or peening is proportionately less and, as a result, the general action is milder but much slower. Actually, then, the choice of the size of medium used depends on how hard or fragile the metal is and how much nicking can be tolerated.

Basic Effects In the Barrel

Reduced to its simplest form, there are only three mechanical actions which can take place in the tumbling barrel:

1. *Chipping*. If the metal is hard and brittle (for example, hardened steel) and has fine thin burrs on its edges, it is possible to remove the burrs by fracturing them from the rest of the piece (see Fig. 3A). Here the burr is chipped off and still retains much of its original shape.

2. *Grinding*. If there is an abrasive medium or compound in the barrel then, as the load tumbles, the pieces rubbing together grind from the surfaces and the edges fine microscopic particles of metal. This process resembles that of a file or grindstone (See Fig. 3-B).

3. *Flowing*. If the metal has any degree of malleability (and most metals do), the surface crystals can be made to flow to some degree when the pieces are pressed or rubbed together. Notice here that *no metal is removed* but that it is merely molded to a slightly different shape. (See Fig. 3-C). This action extends only a short distance from the surface in most cases, and can be carried on to a limited degree only, since such action produces work hardening which resists further distortion. This action is used exclusively in ball burnishing and also occurs in varying degree in almost all tumbling operations.

All mechanical surface action in the tumbling barrel depends on these three effects either singly, in pairs, or individually. Which are used depend on the type of medium and compound used.

A fourth type of action is generally utilized in tumbling and this is of a chemical nature. Such action can be adverse when the work becomes pitted and corroded. However, this can be prevented by the proper choice of compounds. Beneficial chemical effects include lubricating action, cleaning action, descaling or pickling. This is discussed more fully under the subject of compounds.

The water used in the barrel serves different purposes in different instances. In burnishing, in combination with soaps or other chemicals, it acts as a cleaning and lubricating agent. In deburring or grinding, it aids in carrying the abrasive compounds through the mass where their grinding action is constantly effective, or it prevents abrasive medium from becoming loaded with metal grindings and losing its cutting action (this is similar to the use of water or oil on a sharpening stone). It acts as a cleansing agent when mixed with alkalis or acids. It carries out the mud and grindings during the flushing operation after deburring and helps produce a clean finished product.

Nomenclature

At the present time, the terminology used is not too well defined and various writers differ on the meanings attached to the words. The following list gives some of the more generally used words.

Abrasive Compound: A proprietary material consisting of a mixture of abrasives and chemicals used to enhance the action, to help keep the work clean, prevent rusting and pitting, etc.

Ball Burnishing: Tumbling the parts with hardened, highly polished steel balls or other shapes in a solution of burnishing soap. When properly performed, the operation produces maximum brilliance. It is especially useful on the softer, more malleable metals. Sometimes used on plated finishes to improve the final luster.

Burnishing: This may include tumbling the work by itself or with glazed or non-cutting medium and a lubricating or burnishing compound. Also synonomous with ball burnishing or shine rolling.

Burnishing Compound: Proprietary compounds usually containing soap with various chemicals to buffer the solution (and thereby maintain a definite pH range of operation) to soften the water, to prevent tarnish, etc.

Cleaning: Tumbling with an alkaline cleaning solution to remove dirt, oil, cutting compounds, etc. Frequently employed without the use of any medium.

Deburring: In a general way, this covers the entire field of barrel tumbling, except for ball burnishing. Strictly, any operation whereby burrs are removed, in part or entirely or, in some cases merely peened over so that the edge sharpness is no longer objectionable. In a more limited sense, it is applied to indicate a grinding operation using abrasive compounds or media exclusively.

Deburring Compound: An abrasive-containing compound. Also a compound which does not contain abrasive, but is designed for use with an abrasive medium.

Descaling: Tumbling in a solution, generally acid in nature, which is capable of dissolving or loosening rust or scale.

Honing: An abrasive operation which makes use

of a fine grinding action. Frequently applied to the use of limestone medium in tumbling.

Polishing: A mild abrasive action. Applied more specifically to the treatment of hardened steel to develop a low microinch finish.

Rumbling: An obsolete term. Generally applied to the tumbling of parts with cinders, mud, sand, etc. and water. Also called "mud rumbling."

Shine-rolling: A form of burnishing. This is performed in the absence of all abrasive materials. Usually burrs are peened and the work given an improved luster. No medium is used in this operation.

Soap: Generally a burnishing compound. Sometimes applied to all alkaline cleaners.

Tumble-flushing: The operation of flushing out the barrel subsequent to a deburring operation, wherein the barrel is allowed to drain through a screen or perforated door while the barrel is tumbling. This removes fine grindings, chips, etc., much more completely than can be achieved in any other manner.

Classification of Work

Self-tumbling parts: Small screw machine parts, metal stampings and castings which are of simple geometric shape, such as spheres, cubes, cylinders, etc., can often be tumbled without the use of any medium. This makes a highly concentrated load, since all the available space is utilized by the work only. Such parts are usually less than an inch in major dimension.

Free tumbling parts requiring a tumbling medium. Parts which are not of a self-tumbling nature due to size or shape are usually mixed with a medium, the volume proportion of medium to work may range from 2:1 up to 10:1 or even more. Such work may consist of stampings, castings, etc., usually up to 4 or 6 inches in major dimension. This type of work is the most common in the barrel tumbling field. In the larger sizes and weights, there is increasing danger of the parts colliding with each other and becoming damaged, due to nicking. This is particularly true of the softer metals and more fragile parts.

Fixtured parts: When parts are too large or of such shape that they cannot be tumbled freely, they are sometimes mounted on fixtures which are fastened to the walls or doors of the barrel. A tumbling medium is always needed with this type of tumbling. Parts are sometimes fastened rigidly to the jigs or may move freely on the fixture in a restricted part of the barrel.

Individual Parts: Occasionally, large castings require grinding. This is true for machined castings or forgings which contain numerous slots, holes, etc. Often hand burring and filing require many tedious hours of work. In such cases, a single part at a time can be tumbled with medium. Multiple compartment barrels often are used for this purpose and some barrels for this use may have 6 or 8 separate compartments.

Tumbling Barrels

All barrels operate either on a horizontal or an oblique axis (i.e., about 25°-40° above the horizontal). For most tumbling work today the horizontal barrel is preferred and often is necessary. While the oblique type of barrel is more limited in its scope, it is popular in certain cases.

Horizontal barrels are designated as closed barrels or submerged (or tubbing) barrels.

THE CLOSED HORIZONTAL BARREL:

This is the most common type of barrel in use today and comes in small and large capacities. These barrels most commonly have 6-, 8- or 10- sides. For deburring work, they range from about 8″ across the flats (D—Fig. 3) to 36″ or more and from 8 to 60″ in width (W—Fig. 3). Such barrels are often designated as 10 × 24 or 30 × 20 inch barrels, etc. Due to lack of standardization between manufacturers, one supplier may call a barrel 20″ in diameter by 30″ long, a 20 × 30 barrel, whereas another may call the same barrel a 30 × 20. This should be checked carefully with the supplier when purchasing a new barrel.

This type of barrel (Fig. 4-A) is generally supported on two trunnions or fixed bearings. A sprocket gear located at one end of the barrel transmits power from a chain, driven by an overhead motor. Such barrels generally have large movable guard doors enclosing the barrel which must be closed before the barrel can be operated. One advantage of the sprocket-chain drive is that the gear ratios can be changed readily if necessary. Smaller barrels often use "V" belt and pulley drives in the same manner. Some horizontal barrels have flat and pulley drives, although this type of drive is not common today. Many of the small or medium size barrels employ pinion and gear drives and may have manual clutches so that the gears can be disengaged for positioning the barrel manually for unloading, etc.

Most barrels of this type have doors which are a little smaller than one of the flat sides. These doors are locked in place by screws through cross bars

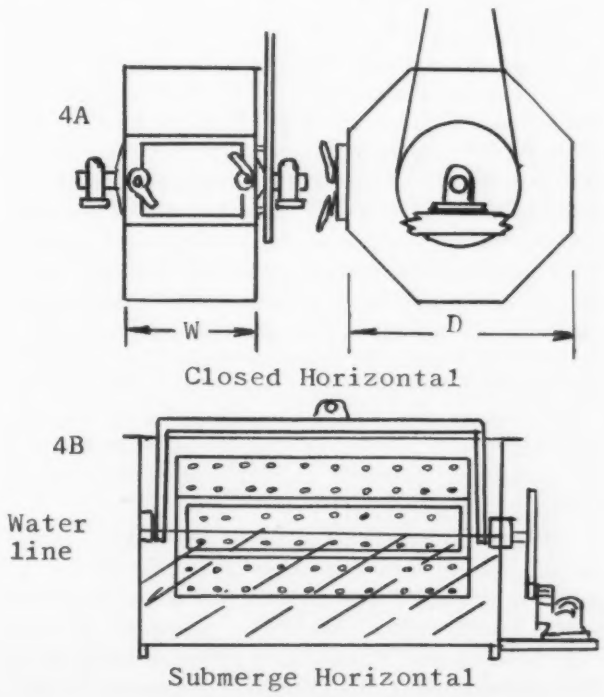


Figure 4.

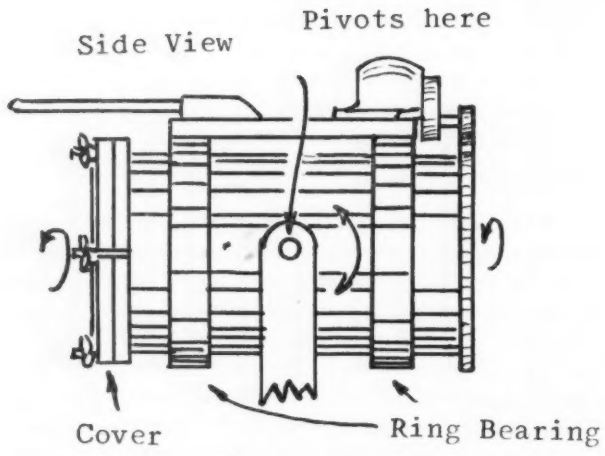


Figure 5. Tilt Type Closed Horizontal

which clamp the cover in place, or by quick locking devices whereby wedges are forced in place by the single turn of a wrench. Doors may be of steel, or magnesium for lightness. In addition to the regular closures, most barrels are also equipped with auxiliary perforated or flushing doors. These are useful in most cases for cleaning the work after grinding or deburring (see below under Tumble Flushing).

Reversing switches and "inching" switches are available on most of the larger barrels and these are not merely gadgets or luxury items but are practical necessities where efficient production is desired. The "inching switches" allow the barrel to position accurately by merely touching the switch button. Such devices usually employ magnetic brakes which prevent the barrel swinging too far and accidently dumping the load.

Variable speed drives are generally available at extra cost. Such a drive gives the barrel greater latitude of operation, since it can be operated slowly when deburring larger, heavier pieces and more rapidly with small light work. Some operators run their barrels quite slowly for the first 5-10 minutes of operation so that the action is more gentle until the load has become well distributed in the barrel and the excessive sharpness of edges and corners has been reduced. The barrel is then speeded up and, after 20-30 minutes, run at its normal speed. The variable speed drive has these advantages and should at least be considered when installing new equipment.

The matter of horsepower of the motor drive should be well considered before purchasing a barrel. Many barrels are supplied with undersized motors which turn the load satisfactorily if it is light as, for example, when using ceramic or limestone chips as the medium, but which labor or stall with heavy loads such as self-tumbling steel parts or when using metallic medium. Before purchasing a barrel this matter should be considered, if there is any probability of the barrel being used for heavy loads.

A Safety Precaution. One accessory usually omitted on the closed barrel is a suitable pressure release device. Any closed barrel is a serious potential hazard since, under certain conditions, excessive pressure may build up and, if there is no means of bleeding off this pressure, there is a danger of explosion. Numerous accidents have occurred due to pressure developing in closed deburring barrels. Such accidents include having the cover violently hurled across the room, cracking the shell of the barrel and, in some cases, barrels have exploded with damage to the building and nearby equipment. Pressure develops to a moderate degree from the heat generated by the friction of the tumbling parts. This type of pressure build-up is due mainly to the vapor pressure of the water in the barrel increasing and the expansion of air. The more serious pressures are due to chemical action between the finely ground metal, water and, possibly, the chemicals in the barrel. Finely divided metal particles and oxide-free metal surfaces are easily attacked by water to form oxides and hydrogen gas. The metals which are most susceptible to this type of action are iron, zinc, aluminum, and magnesium. Some of the accidents occur because the operator used the wrong chemicals for a given metal. Others are caused by pressure developing when the tumbling time is very long. Thus, while steel can be tumbled under a given set of conditions for a few hours with no apparent pressure build-up, the same charge may easily develop dangerous pressures after 20 or 30 hours.

Having a barrel equipped with a pressure vent is not sufficient; the operator also should be trained to keep the vent clean and in proper operating condition each time the barrel is loaded. Deburring always give rise to mud and grindings which readily accumulate in vent tubes and plug them or cement the valves in place.

Various pressure releases are available or can be made in the plant. Some barrel covers have spring pressure discs installed in the cover. Barrels with cross-bar closures will often allow the cover to loosen itself and vent some of the excess pressure. Petcocks are an added precaution and the operator checks the pressure (and releases it) by merely opening the petcock before opening the barrel door. The most satisfactory type of vent is a mechanical lever and spring device which vents the barrel on each rotation. At the present time, this type of device is usually

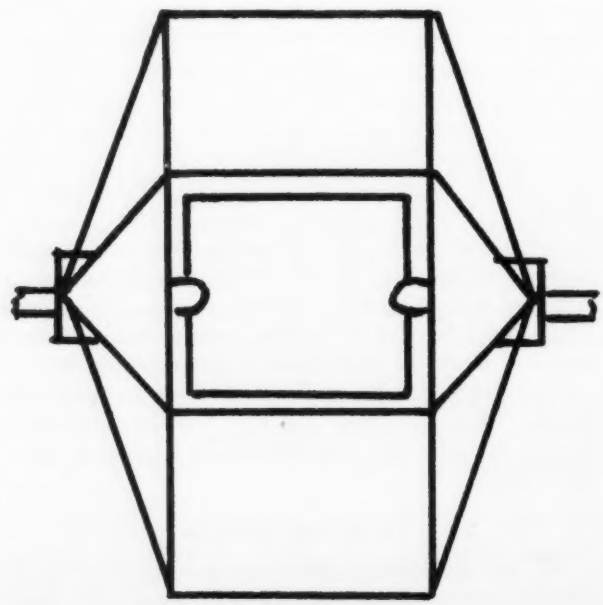


Figure 6. Triple Action Barrel

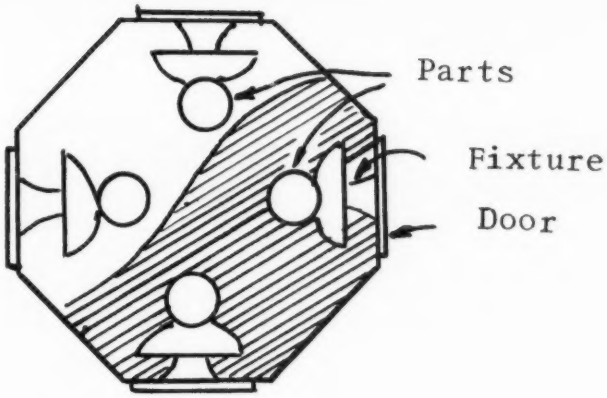


Figure 7.

home-made, since it is fairly simple in design. A small hole is drilled in the wall of the barrel. This hole is closed under spring pressure by a small ball on a lever. When the lever-closure reaches the top of its turn, a skid or roller affixed to the frame pushes against the lever and opens the vent.

While on the subject of safety, it should be noted here that all covers should be designed so that, when loosened, they cannot fly off from the barrel. There should be a release arrangement so that the first turn of the wrench releases any pressure, and a second turn releases the cover for removal.

THE HORIZONTAL "TUBBING" OR SUBMERGED BARREL:

This type has long been used in the jewelry trade and is frequently known as a "jeweler's barrel." Basically, it consists of a barrel, with perforated sides, which rotates in a rectangular tub (Fig. 4B). Jewelers' barrels are usually made of wood, some with a removable side. Some are hinged near the center and are equipped with a sieve arrangement so that, at the end of the run, the sieve can be inserted in the barrel, the barrel turned 180° and shaken. This allows the medium (usually steel balls) to drop through the tray-like sieve, leaving the work on the sieve for ready removal. Other tubbing barrels have several small compartments supported in a cradle. The entire compartment is lifted out for loading. The tubbing barrel is usually about 10-14″ across-the-flats and 8-16″ long. It is used almost exclusively for ball burnishing.

Larger forms of this type are called submerged barrels and may range in size from 12-20″ in diameter and up to about 30″ in width. Such barrels require overhead hoists for removal from the tank for loading. They use non-abrasive compound but employ an abrasive medium. Due to the perforations in the barrel, small chips both of metal and of medium are removed from the work load. This helps prevent scratching of the surface by hard, small chips. The author used a rubber lined barrel of this type but found that the chips tended to lodge in the perforations and this was very much of a nuisance. An unlined barrel with holes about 3/16″ or ¼″ would be less liable to plugging of the perforations.

CLOSED HORIZONTAL PIVOTED BARRELS:

Several companies produce long narrow barrels which are pivoted in the center for loading and unloading. In this type, one end of the barrel is removable and forms the door. This barrel comes in sizes of 12″-17″ in inside diameter and up to 30″ in width (see Fig. 5). One barrel has a ring gear drive and runs in roller-bearing rings, which makes it quite compact. In another make, the barrel is suspended in a fork mounted on a long set of bearings. This type is very convenient to load and is excellent for ball burnishing. It should be more popular.

TRIPLE ACTION HORIZONTAL BARREL:

This is a variation of the usual horizontal, having slightly pyramidal ends. (Fig. 6). Due to the variation in cross-section, the load tends to be folded in from both sides in the sliding zone. As a result, more action takes place per revolution than occurs where the ends are parallel, and more intimate mixing is maintained.

SMALL LOT TUMBLING:

Equipment used for this work varies from small porcelain jars which rest on revolving rubber rolls up to small barrels of 8 × 14″ size. This type of equipment is often necessary where parts are very tiny and where a quart or two might be a month's supply of a given part. Small lot barrels similar to large barrels are available as bench models. Multiple barrel units are also available for small lot work wherein as many as 6 or more small barrels are rigidly mounted on a perforated plate which revolves. The barrels are removable so that changing the barrels does not appreciably interfere with the processing of the other barrels.

FIXTURED BARRELS:

Where moderately heavy or large, fragile parts are to be tumbled, there may be considerable damage due to collision and the work may become badly bruised, bent, or even broken. To prevent such damage, parts may be strung on rods or fastened to jigs in such a way that they can no longer collide or interlock. Usually, such fixtures are custom-built for the job. Fixtures of this kind are frequently located on the inner face of the barrel door for easy loading. Some barrels for this purpose have two or more doors so that more fixtures can be tumbled at a time. (Fig. 7). In some instances, barrels of the end-opening type may have a single large fixture attached to the door. In most cases, where a fixtured barrel is used, it is necessary to operate the barrel in one direction for half of the time, and then reverse it for the balance of the run. This produces a more uniform action on the work. The work may be attached rigidly to the fixtures or may be allowed to swing loosely in some cases. Which type of mounting is used depends

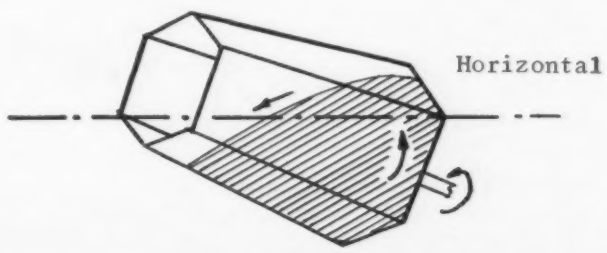


Figure 8. Oblique Barrel

on the shape, fragility, and ease of mounting of the parts. Where loose mounting is possible, it has the advantage of lower labor costs.

While fixtured barrels have their use, particularly on intricate parts where hand burring is expensive, it should be borne in mind that, at best, only a limited number of parts can be processed at a time and considerable labor may be required in loading, racking and unloading.

MULTIPLE COMPARTMENT BARRELS:

Barrels with 2 or more compartments are fairly common and are useful where limited amounts of several different parts are to be processed simultaneously using the same operating cycle. If the processes used are appreciably different, then it is better to use several smaller barrels since the down time for loading, rinsing, etc., each compartment becomes appreciable and tends to lengthen the cycles to compensate for lost rolling time.

Barrels with 8 or 10 compartments are used for processing moderately large pieces which can only be tumbled individually. This is one way of avoiding the use of fixtures, and unloading is achieved by the operator removing each piece by hand and adding a fresh piece. Usually large doors are used so that 2 or 4 compartments are open at a time.

AUTOMATIC BARRELS:

Barrels which load and unload through screw feeders are available but have found limited application. Some barrels separate the work from the medium but, usually, such applications are limited to use with ball medium since irregular shapes tend to catch in the perforations unless the openings are large, in which case small work pieces may catch in the holes.

Recently, automatic processing machines have been developed for carrying out a series of tumbling operations automatically. This type of operation is limited to the submerged type of barrel, and the barrel is transferred from tank to tank where the work may be cleaned, rinsed, pickled, deburred, etc. The high cost of such installations makes them generally impractical, except in certain large installations.

OBLIQUE BARRELS:

This type of barrel (Fig. 8) is generally slightly conical with the bottom somewhat wider than the open top. It rotates on a concentric shaft at an angle of 25°-40° above the horizontal. Usually the carriage or pedestal is of such a nature that the barrel can be moved from below a horizontal position to a nearly vertical position by means of a ring and worm, or a chain and crank arrangement, for rapid loading, unloading, and rinsing. When the walls are circular, the barrels are designed for sawdust tumbling. For deburring, 8 or 10 sided barrels are to be preferred since smooth cylindrical barrels do not provide sufficient friction between the load and barrel wall to tumble the pieces properly, except in the case of light loads.

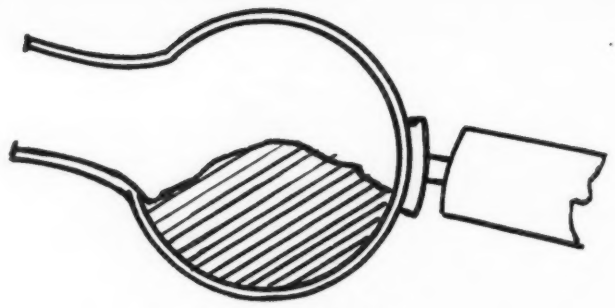


Figure 9. Bottle Neck

The principal limitation of this barrel will be better understood by reference to Fig. 8B. It will be noted that, as the barrel rotates, there is a tendency for the work to heap higher near the closed end of the barrel than at the open end. As a result, two directions of flow of the sliding zone develop, one of which is transverse to the axis of the barrel and the other toward the open end. The net result of this double action is that larger pieces or less dense pieces slowly work toward the open end and the smaller or denser pieces group at the bottom. This separation becomes quite pronounced after 10-15 minutes of operation and any tumbling medium becomes completely ineffective in a very short time. Consequently, in general, this barrel is unsuited where work requires a rolling medium. It is, however, very well suited to processing self-tumbling parts and can be used for cleaning, shine-rolling and descaling very rapidly. This barrel ranges in size from about 15 to 36″ in diameter and 20 to 40″ in height.

BOTTLENECK BARREL:

This is a variation of the oblique barrel which, due to its shape, can be operated in a nearly horizontal position. Due to its shape (Fig. 9) it resembles a triple action horizontal barrel and has the same general construction as an oblique barrel. This can be used with a medium. The capacity is relatively small but it is suitable for moderate small part production.

(To be Continued)

Application of Ultrasonics in the Electroplating Industry

By Dr. T. J. Bulat, *Head, Ultrasonic Applications and Research Labs., Pioneer Central Div., Bendix Aviation Corp.*

SEVERAL decades ago a number of scientists, working independently, were amazed at the unusal phenmoena resulting from transmitting high frequency sound through liquids. What they saw, felt and heard is now defined as cavitation. This is explained as voids or bubbles having their origin in minute gas particles which grow or expand when acted upon by sound waves. These voids grow to a predetermined size, depending on the nature of the liquid, pressure at the surface of the liquid, and other factors. Then, for reasons not completely understood, they will collapse. It is this collapse that sets up fantastic accelerations which are harnessed to accomplish useful work. The negative pressures generated by the collapse of these voids throughout the liquid impart a phenomenal type of agitation in the liquid, which cannot be matched by any other method of agitation.

For thirty years or more, scientists and experimenters in all parts of the world have used this cavitational process to mix immiscible liquids, destroy bacteria, clean intricate mechanisms, disperse metals in liquids, break up various polymers, produce chemical reactions, and myriads of other applications of scientific interest. These, and other reactions produced by sound, caused many serious minded experimenters to undertake the design of equipment large enough to enable these wonders of sound power to be applied on an industrial scale.

From test tube to industry it was, a long and torturous road since the production of sound on a commercial scale required equipment of a type and size not yet in existence. During World War II, the need of submarine detecting systems placed the governmental backing of several nations behind large scale research and engineering on ultrasonic transducers and generators for operating them.

Generators and Transducers

Before discussing the possible advantages of ultrasonics to the electroplating industry, a brief description of a commercial ultrasonic system may be of interest.

Ultrasonics, by accepted trade definition, refers to mechanical vibrations which occur at a frequency at, or above, 15,000 (15-Kc) vibrations per second. The production of ultrasound requires two basic devices. A generator to convert 60 cycle or commercial line power to 15,000 cycles or more, and a transducer to convert the high frequency electrical energy into the equivalent mechanical vibrations. Generators may be either rotary or electronic. Either type produces an acceptable sine wave. Electronic generators are generally preferred since transducers shift in frequency as they warm up in use and an electronic generator can easily be tuned manually or automatically to follow this frequency shift. Both are reliable. In smaller systems the tube generators are more economical and, in larger systems, generally above 50 KW, the rotary generators cost slightly less. There are two types of transducers used commercially today. The peizoelectric or crystal type, and the magnetostrictive.

For many technical reasons, the natural quartz crystal transducers have been abandoned in favor of the ceramic barium titanate, $BaTiO_3$, (Fig. 1). When a voltage from the generator is impressed across this ceramic, it vibrates at its natural frequency. It is assumed, of course, that the electrical output of the generator is tuned to the natural resonance of the transducer. A ceramic transducer may be made to vibrate at more than one frequency by applying an

Figure 1 Barium titanate (ceramic) transducer.

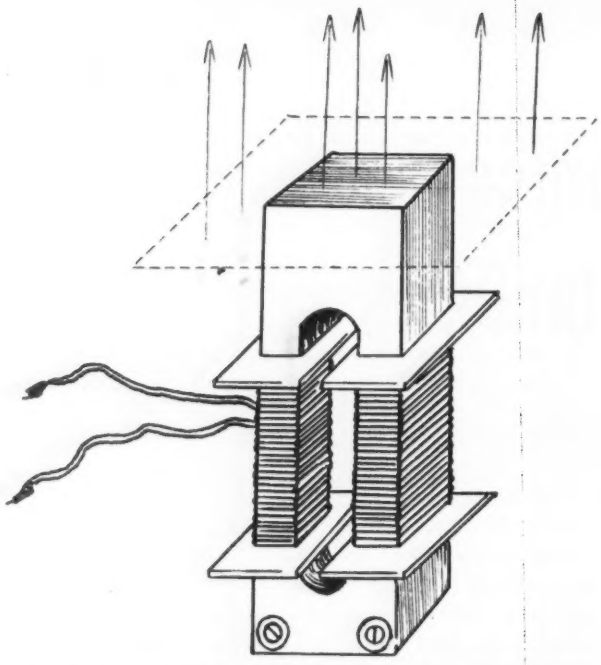


Figure 2. Magnetostrictive transducer stack showing electrical windings leading to the generator.

electrical voltage, that matches in frequency one of the several modes to which these transducers will vibrate. The advantages of ceramic transducers are: low cost, high efficiency, and the fact that they are polarized when manufactured, thus eliminating external polarization. Their disadvantages are: they are easily broken, their efficiency drops off rapidly with temperature rise, and permanent depolarization occurs when critical temperature is reached.

The magnetostrictive transducer (Fig. 2) is composed of metal laminations which change their length under the influence of an electrical field. Although many metals exhibit this magnetostrictive effect, only two kinds of metal are used commercially. Nickel exhibits negative magnetostriction, or contracts irrespective of the sine of the voltage, whereas permandur expands. The fact that metal changes in length, either on the positive or negative half of the cycle, indicates the transducer would act as a frequency doubler unless polarized. To prevent this and to increase the efficiency, a magnetostrictive transducer has to be polarized constantly while in use. Its efficiency is less than barium titanate; however, it has many other features that make it the "work-horse" of the ultrasonic industry. It is virtually indestructible and has a broad response curve, thereby making it less sensitive to generator frequency shift. Its curie point, or the temperature at which it will cease to function as a transducer is over 1,000°F in the permandur stacks and several hundred degrees in the nickel stacks.

The author's company was forced into the design and manufacture of ultrasonic equipment a number of years ago for two reasons. First, as manufacturers of precision aviation instruments they required cleaning beyond the scope of existing methods. Secondly, there existed no commercially available ultrasonic equipment which was rugged, dependable and large enough to be of industrial importance. One of the prime interests was the role that this new found energy might play in the electroplating field. This discussion, therefore will be a brief report on findings in this endeavor.

Applications

There were three obvious fields of investigation to pursue in electroplating:

(1) Activation of the bath in an electroplating process.
(2) Activation of an electroless plating bath.
(3) Ultrasonic cleaning prior to plating.

Experiments were made on several types of plating baths which included copper, bright nickel, dull nickel, bright silver, mat silver, chromium, etc. The effects of ultrasonics on the electroplating bath was much the same for all baths. The beneficial effects was to increase the conductivity of the plating bath by reducing polarization. This increase in conductivity brought the advantages of plating at higher current densities without burning, a more even distribution of the deposit, elimination of tree formations, and better throwing power.

Initial results were very gratifying and it appeared as though ultrasonics really had something spectacular to offer electroplating. However, the tests were run comparing a still bath against an ultrasonically agitated bath. The next stage of the testing was to compare an ultrasonically agitated bath against a mechanically (impeller) agitated solution. The advantages gained by mere mechanical agitation were, for the most part, almost on a par with those obtained through ultrasonics. These results, then, rendered ultrasonic plating impractical in a production plating system due to the fact that ultrasonic agitation is more costly than mechanical agitation. Although this seriously limits the sonic plating process, it does not mean that it is completely eliminated. Ultrasonic plating can still be of value in the processing of critical parts where specific effects are absolutely necessary. In essence then, these experiments have pointed out that, if ultrasonics is being considered for plating, a careful study must be made to determine whether the advantages gained are economically plausible. Many articles in recent journals have made broad claims for ultrasonic plating. The disturbing point about some of these articles is the fact that they failed to point out that the data presented were of an experimental nature, or that advantages cited were based on the comparison of an ultrasonically agitated bath against a still bath.

The second evalation was in the ultrasonic activation of electroless plating. The electroless bath depends entirely on chemical reaction for its results. Ultrasonics has many know applications in chemical activation. In fact, energies produced by cavitation often cause a catalyst type reaction. It was, therefore, logical to suppose that some advantages could be gained through ultrasonic activation of the electroless bath. However, experiments again showed negative results. Instead of enhancing desirable chemical reactions, ultrasonics triggered side reactions which caused the metallic ions to precipitate out of the bath.

The third phase of these experiments was concerned

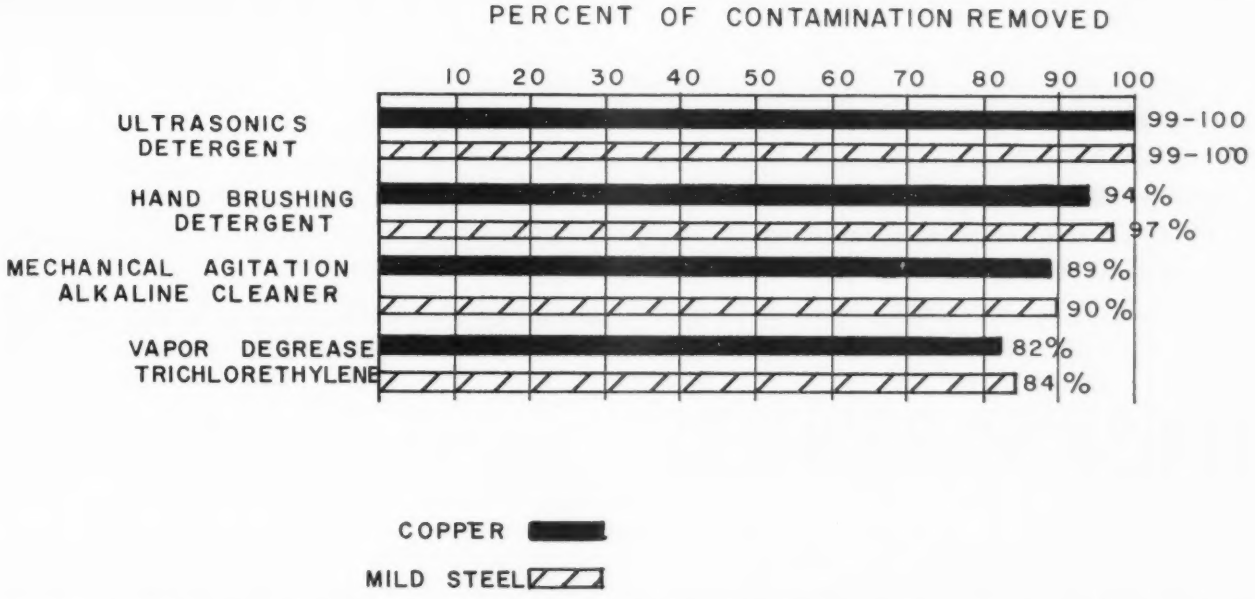


Figure 3. Percent of radioactive oil and buffing compound removed from copper and steel blanks, showing comparative results obtained using several industrial cleaning procedures.

with ultrasonic cleaning prior to plating. This proved to be extremely effective. Satisfactory experience with the use of sound waves in many other industiral cleaning situations predicted success in pre-plating cleaning. Cavitational energy combined with the proper cleaning solutions served to remove all traces of contamination from metal surface even into the porosity of the metal. The advantages gained are a thorough and quick cleaning which result in time and cost savings; and better adhesion and better distribution, ultimately resulting in a superior end product.

In order to better evaluate the effectiveness of ultrasonic cleaning a group of copper and mild steel blanks were coated with radioactive oil and buffing compound and allowed to air dry at room temperature for thirty days. At the end of this period, the parts were cleaned by hand brushing in a detergent, mechanical agitation in an alkaline cleaner, vapor degreasing in trichlorethylene, and ultrasonically in water and detergent. The amount of oil and buffiing compound remaining after these cleaning processes was then recorded with a scintillation counter and the amount of contaminant removed was easily calculated (See Fig. 3).

In summary it can be said that, in direct activation of the plating bath, application is limited to specific critical parts; the electroless bath is rendered ineffective by side reactions, and ultrasonic cleaning prior to plating has proved very advantageous.

DENSITY AND POROSITY OF ANODIC COATINGS ON ALUMINUM

(*Continued from page* 57)

by applying the Archimedes principle and using toluene as the suspension medium. The density values were used to calculate the percent pore volume. In general, density values decreased and the porosity increased as the temperature and concentration of the electrolyte increased.

The oxide coatings on 2024-T3 aluminum had, in general, lower densities but greater pore volumes than those obtained on 1100-H16 aluminum.

Acknowledgment

Acknowlegment is made to *Dr. H. B. Fisher* who demonstrated that the suspension method in toluene was suitable for determining the actual density of anodic coatings and to *Miss M. J. Blackburn* who made many of the density and porosity determinations.

References

1. W. N. Bradshaw and S. G. Clarke, J. Electrodep. Tech. Soc., **24**, 147 (1949).
2. J. D. Edwards and F. Keller, Trans. Electrochem. Soc., **79**, 135 (1941).
3. R. C. Spooner, J. Electrochem. Soc., **102**, 156 (1955).
4. J. Oldier, Metaux, Corrosion, Usure., **20**, 113 (1945).
5. N. D. Tomashov and A. V. Byalobzeskii, Trudy Inst. Fiz. Khim., Akad., Nauk S. S. S. R. **2**, Issledovaniya po Korrozii Metal., No. 1, 136 (1951 ibid **3**, No. 2, 17 (1953).
6. H. Fischer and F. Kurz, Korrosion u. Metallschutz, **18**, 42 (1942).
7. F. Keller, M. S. Hunter, and D. L. Robinson, J. Electrochem. Soc., **100**, 411 (1953).
8. R. L. Burwell, P. A. Smudski and T. P. May, N. R. L. Report No. C-3093 (1947). J. Am. Chem. Soc., **69**, 1525 (1947).
9. L. A. Cosgrove, J. Phys. Chem., **60**, 385 (1956).
10. W. G. Burgers, A. Claassen and J. Zernike, Z. Physik, **74**, 593 (1932).
11. G. Missier and W. Ruff, Alluminio, **19**, 518 (1950).
12. A. Prati, Alluminio, **22**, 148 (1953). ibid **23**, 7 (1954).
13. Elze, Metal, **9**, 458 (1955).
14. P. Lenz, Aluminum, **32**, 126 (1956).
15. J. D. Edwards, Proc. Am. Soc. Testing Materials, **40**, 959 (1940).

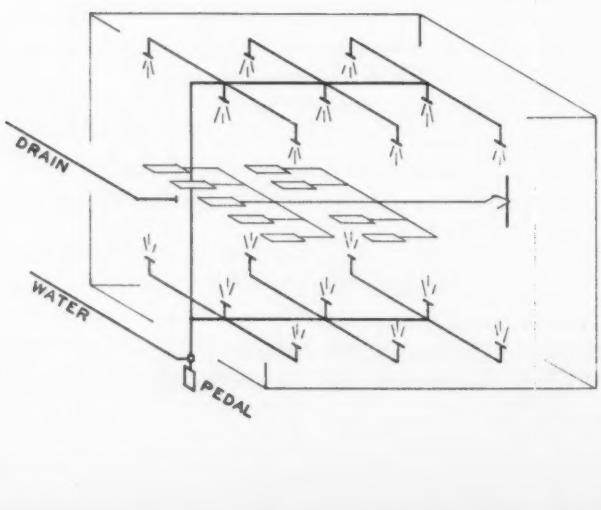
FINISHING POINTERS

Centralized Spray Rinsing

By J. B. Mohler

A LABORATORY man was once called to a production department to correct troubles of excessively spotty plating. The trouble proved to be due to skipping or rinsing steps. A novice was substituting for a plater on vacation and simply had not been instructed as to when rinsing was required. The trouble was corrected easily by following the proper standard cycle. This sort of experience points up the reliability of an established plating cycle. At the same time, it makes us realize that rinsing is a practice, almost a habit, after each processing step. More than this, it is a necessity, but we really know little of what is actually required at the metal surface for many of the rinsing steps. Unfortunately, also, we frequently do not know how clean the rinse water has to be in order to maintain quality.

Troubles have been encountered in a plating cycle by using a common rinse tank both for acid and alkaline rinsing. For instance, insoluble and troublesome precipitates will form on steel that is pickled and then rinsed in an alkaline rinse. In general it is safe to use a separate running rinse tank after each step. A cycle is set up on this basis and this practice is common. For a single purpose production plating line this is the correct procedure.



Rinsing can become an unknown variable where many types of processing are done in the same area. Such can be the case for experimental work or small scale multi-purpose production plating. Often it is not practical to maintain a separate running rinse for each step for the simple reason that excessive space is required for the rinse tanks. A technical man was once faced with just this problem. Enough space was available for a great variety of processing and plating tanks, but not enough space for as many rinse tanks as would be desired. His solution to this problem was simple. He placed the processing tanks around the room and installed a simple spray rinse in the center of the room. This is an extreme case, but it demonstrates the effectiveness of a spray rinse. It is better to have a few rinse tanks strategically placed for convenience. However, if rinsing is an unknown, then at least one properly placed spray rinse is the answer.

A spray rinse is effective because one can rinse with clean water. Acid can be rinsed from one rack of parts followed by rinsing away of alkali on the next rack. The water remains the same regardless of the previous use of the rinsing station. The work can be rinsed until it is as clean as the water being used. Possibly spray rinsing is not always the best means for rinsing. However, if a cycle is established by the means of spray rinsing, then the rinsing steps will not be the variable that they can be where multi-purpose running rinses are used.

A multi-purpose spray rinse is shown in the sketch. Water need only be used when the work is in the rinsing station. A pedal is convenient for a quick supply of water. The sprays should effectively cover all areas of the work. Water should be plentiful at the top of the racks so that clean water flows down the work and washes away unclean solution below. If the rinsing station is square, spray nozzles are best placed on all four sides. If the rinsing station is long spray nozzles on the two long sides will suffice.

Many types of spray nozzles are available. Sprays may be flat, round, or adjustable for angle and pattern. Air can be used with the water to produce a fine spray with good coverage. In any case, the rinsing station should essentially be flooded with spray when the water is on.

For non-routine work or multi-purpose processing a centralized spray rinse station assures reproducible rinsing.

Science for Electroplaters

27. Waste Disposal -- III.

By L. Serota

Chemical Treatment

THIS method involves the destruction or conversion of toxic wastes in plating operations effluent. In general, this would include neutralization of acids or alkalies; precipitation of the heavy metals (copper, iron, trivalent chromium) and subsequent removal as sludge; reduction of metals in anions. Additional procedures would be conversion of toxic complex ions to less toxic forms, such as the formation of the thiocyanate radical when cyanide wastes are mixed and heated with lime - sulfur; the change of cyanide of cyanide waste to cyanate, or to carbon dioxide and nitrogen with chlorine at pH above 9; conversion of the complex cyanides to the insoluble complex iron compound, Prussian blue, by the addition of ferrous sulfate; the formation as suggested by D. Milne, of the less toxic nickelocyanide complex; acidification and aeration, as in cyanide, with the liberation a gas; electrolytic oxidation of waste cyanides.

Acid Wastes

Utilization of alkali wastes for the neutralization of acid waste solutions is practiced when feasible. Control instruments or units are commonly used to regulate the pH value, which is adjusted so that the pH of the effluent will be between 8 and 9. Most of the heavy metals (excluding chromium as chromate ion) will precipitate almost completely as hydroxide (sludge) at this pH. Since these hydroxides are but slightly soluble, (usually less than 1 ppm) a clear effluent, virtually free of objectionable impurities, will result if the precipitate (of metal hydroxides) is separated or allowed to settle.

Adjustment of pH is made by the addition of caustic soda, soda ash, or such lime products as hydrated lime, which may be a high calcium lime, dolomite, or high magnesium lime. The dolomite lime produces less sludge than the high calcium lime and is preferred where the sludge must be kept to a minimum. High-calcium lime has the advantage of faster reaction rate.

The cost of caustic soda (or soda ash) will usually rule out its use in favor of calcium salts. The sodium salts are more soluble, however, resulting in a reduction of sludge, an advantage that favors the use of caustic soda in some cases.

Waste Acid-Alkali Treatment

Applicabilty of this procedure may be studied by reference to several plants where it is employed. S. E. O'Conner reported in METAL FINISHING (1953), that the method was in use at the Indianapolis plant of the Western Electric Co., with a waste water discharge of 700 to 800 gallons per minute from the plating room, made up in part of mixed acid and alkali rinses with a flow rate of 320 gpm. The pH of these acid-alkali waste liquors varied from a pH of less than 1 to a value that might be over 13. The treatment system consisted of six 3000 gallon rubber lined steel tanks, through which the waste flowed and mixed to prevent too wide a variation in composition. Caustic soda was added to the last tank to maintain a pH above 6 for the effluent before it was discharged to the sewer. A recording pH controller regulated the amount of alkali used. A simplified schematic diagram, Fig. 134 represents this process of acid waste disposal.

In a paper presented at the 41st Annual Convention of the A. E. S., B. F. Dodge described the methods employed for the treatment of plating waste at a silverware plant. The wastes are classified as (a) acid wastes (with a flow rate of 40,000 gallons per day), which included rinses, dumping from bright dip operation, and a silver stripping process; (b) silver bearing waste (5,000 gpd); (c) alkali wastes (160,000 gpd) with low concentrations of cyanide; metal and large amounts of organic matter comprising all wastes not included in the two previous classifications.

The acid waste is used to adjust the pH of the alkali waste during the two stage cyanide oxidation cycle. In the

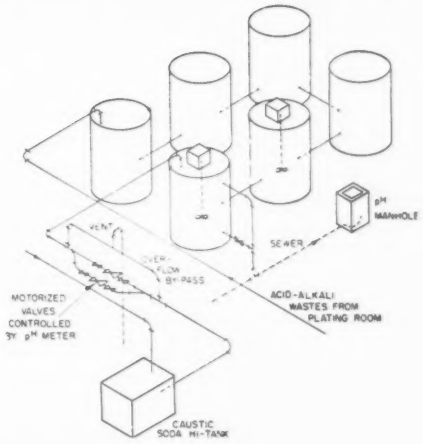


Chart E

Figure 134.

first step, involving the oxidation (with chlorine) of the cyanide to cyanate, the pH is adjusted in a regulating tank where it is raised by the addition of lime slurry, or reduced by the addition of waste acid to a pH value of 10.5. In the second phase of the process the pH is lowered to 6.5 by the addition of waste acid, at which pH value oxidation of the cyanate to carbon dioxide and nitrogen occurs. The alkali waste is further reduced to a pH of 3 with acid waste in a skimming tank. At this concentration, soaps and oils present in the waste will appear as skimmings, which can be removed to a lagoon. The steady flow of alkali and acid wastes leaving the skimming tank enters a pH adjustment tank where the addition of lime slurry will raise the pH to 8.5. This will result in the formation of metal hydroxides. This sludge is removed in settling tanks and the effluent discharged through gravity sand filters. The silver in this waste disposal process is recovered from the silver chloride.

A most impressive example of modern methods in waste treatment, reported in *Plating* (1955), is that relating to the extensive installation of a waste disposal process, as a supplement to the plating shop, at the Douglas Aircraft Plant. The unit is equipped to handle a combined alkaline-acid flow of 750 gallons per minute with a concentration of 1500 pounds of cyanide per day in the alkaline waste and 2,000 pounds of hexavalent chromium in the acid waste. These wastes are received in separate reservoirs where the hexavalent chromium in the acid waste tank is reduced to trivalent chromium by sulfur dioxide at a pH of approximately 2.5, and the cyanide in the alkali waste receiver is oxidized with

chlorine to cyanates at a pH of approximately 9.

Regulation of the amount of sulfur dioxide applied is based upon the difference in oxidation-reduction potentials between trivalent and hexavalent chromium, thereby permitting the use of O-R-P equipment for such control. In like manner, a control unit for the flow of chlorine depends, for the amount used, upon the difference in oxidation-reduction potentials between the untreated and oxidized cyanide waste.

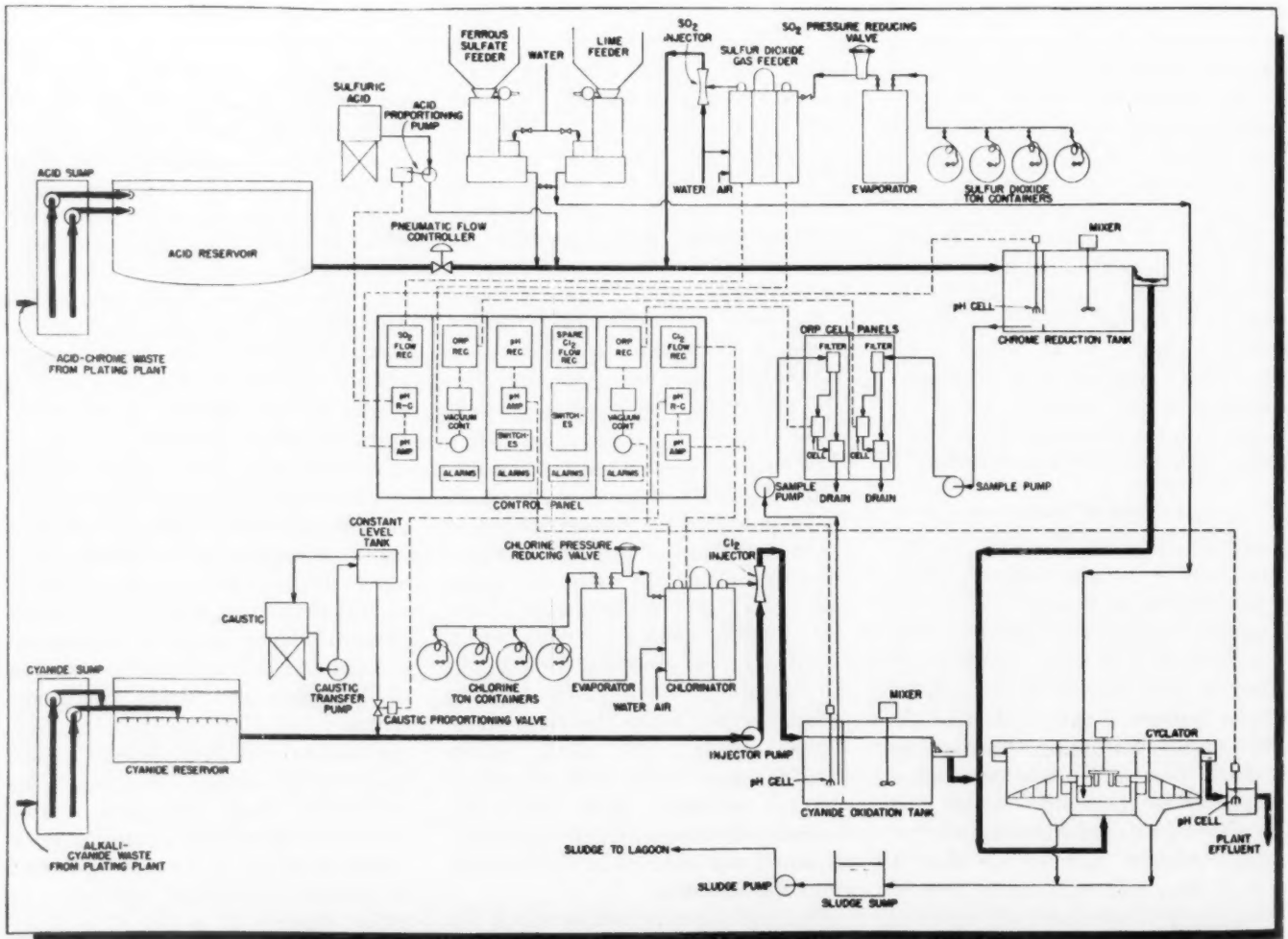
At the Douglas plant, the treated acid and alkali wastes are then mixed, the metals precipitated with lime as hydroxides and removed in a sludge settling tank. The effluent, for which the pH is recorded, is discharged to a tributary of the Arkansas River. The sludge, consisting of the precipitates of chromium and other metals, is pumped from the settler to a lagoon for impounding. Fig. 135 is an excellent flow sheet representing the complete waste treatment cycle. A manually controlled dry feeder, it will be observed, is shown in the flow sheet. This unit is used when additional reductant is needed to supplement the use of sulfur dioxide.

Limestone Treatment

Crushed (lump) limestone, used as a percolating filter, is also employed for neutralizing acid wastes. Although this process is considered one of the cheapest, its application is usually limited to waste acid liquors which do not contain the heavy metal ions. D. Milne reports in the METAL FINISHING GUIDEBOOK (1955) that such beds are seldom satisfactory for solutions containing sulfuric acid in amounts greater than ½ to 1 percent because of the formation of insoluble calcium sulfate which forms an unreactive coating over the stone. B. F. Dodge in a report in A. E. S. Project No. 10 adds that experimental evidence indicates that the presence of iron in such small amounts as 5 ppm in the acid waste will make limestone ineffective. The reason given is the formation of insoluble iron (ferric) hydroxide, which will deposit as a coating on the stone at a pH of 3.0 or higher. The view is advanced that the hydroxide of chromium will produce the same effect. This method for acid waste treatment is employed at the Albert Plating Works automatic plant in Brooklyn. Baffled partitions in the sumps aid in producing up and downflow through limestone for neutralization of acid wastes.

Pickling Wastes

Waste pickle liquors, in the absence of waste alkalies, are generally treated with lime. This procedure, as in other waste acid processes, will result in neutralization of the free acid, precipitation of iron in steel pickling, and of other metals such as zinc and copper in brass pickling. Disposal of this sludge, consisting mainly of hydroxides of the metals, is achieved by the use of settling tanks or clarifiers. This type of treatment is employed by the Gilbert and Bennett Mfg. plant in Georgetown, Conn., where the waste



FLOW SHEET FOR THE TREATMENT OF ACID (CHROMIUM) WASTE AND CYANIDE WASTE FROM THE PLATING PLANT

Figure 135. Acid-chrome waste, upper third, alkali-cyanide waste; lower third, control panel center.

from the pickling of steel rods is neutralized with lime, and the sludge separated from the clear effluent in a 60,000 gallon clarifier.

The following equations for neutralization of pickle liquor with dolomitic lime are given in a report by Orsanco, 1951. The equations, it is emphasized, represent a dolomitic lime consisting of equimolar proportions of lime and magnesia, with the magnesia considered completely hydrated by slaking.

$$2H_2SO_4 + Ca(OH)_2 + Mg(OH)_2 \rightarrow CaSO_4 + MgSO_4 + 4H_2O$$

$$2Fe_2(SO_4)_3 + 3Ca(OH)_2 + 3Mg(OH)_2 \rightarrow 3CaSO_4 + 3MgSO_4 + 4Fe(OH)_3$$

$$2FeSO_4 + Ca(OH)_2 + Mg(OH)_2 \rightarrow CaSO_4 + MgSO_4 + 2Fe(OH)_3$$

$$2MnSO_4 + Ca(OH)_2 + Mg(OH)_2 \rightarrow CaSO_4 + MgSO_4 + 2Mn(OH)_2$$

$$2Fe(OH)_2 + \tfrac{1}{2}O_2 + H_2O \rightarrow 2Fe(OH)_3$$

Air Oxidation

R. D. Hoak describes a method, in *Industrial Engineering Chemistry* (1949), for reducing the volume of sludge and increasing the rate of filtration in the process of neutralization of waste pickle liquor, by an oxidation process. This is attained by controlled oxidation of the ferrous hydroxide to ferrous-ferric oxide by feeding pickle liquor at a predetermined constant rate to an alkaline bath in a reactor maintained at a temperature above 75°C. Adequate aeration is provided in the unit by high speed impellers. Pickle liquor is fed, at a constant rate, to an alkaline slurry left in the reactor from a previous batch as a check. An alkaline agent equivalent to the amount of liquor to be added is also slaked and mixed with the slurry in the reactor. The solution is tested for soluble iron. If present, aeration continues until the iron is oxidized and precipitated. Under controlled conditions, the iron is precipitated when the pickle liquor feed is completed. The author states that operational effectiveness is a function of the balancing rate of iron precipitation with the rate of oxidation of ferrous hydroxide. The ratio of ferric to ferrous ions should be between 2 and 5. The equation for this oxidation is expressed as follows:

$$3FeO + \tfrac{1}{2}O_2 \rightarrow FeO.Fe_2O_3$$

High calcium lime, dolomitic lime, and magnesia were used as alkaline agents and are adaptable for use to any regional condition. The controlling factors are oxidation rate and agent reactivity. This process changes the precipitate in the slurry to a smaller sludge volume with the result that settling is complete in about an hour, filtration rate is increased, and a solution is provided to plants with limited lagoon space.

L. W. Heise and others describe a method in *Sewage and Industrial Waste* (1955), of treating waste pickle liquor by controlled oxidation and continuous lime treatment. Waste pickle liquor and lime slurry, which was obtained as a by-product from acetylene production at the A. O. Smith Corp., Milwaukee, were pumped continuously into a reactor where the mass was mixed by agitation. The reactor was fed in controlled quantities where a pH of 7.0 to 8.0 (neutralization) was maintained. Results showed that best filtering rates were obtained when 2 to 5 percent of the ferrous ion in the waste pickle liquor was oxidized to the ferric state. This was attained by blowing compressed air through the bottom of the agitated mixer. Control for both the neutralization and oxidation steps was attained by use of a conductivity meter. The sludge filtered by a disc-type vacuum filter yielded a filter cake containing 50-60% moisture. A good part of the filtrate was utilized for preparing the lime mixture. The rest of the filtrate was emptied into the municipal sewer. The daily discharge of filter cake was about twenty 10 ton truck loads.

Recovery of pickle liquor wastes is indicated in a number of developments. N. J. Reutschler reports, in *Iron and Steel Engineering* (1939), the conversion of sludge from steel pickle liquor, consisting of calcium sulfate and iron hydroxide, to a construction material known as Ferron, a process considered feasible when large amounts of pickle liquor are available. Another instance occurred at the Ford Co.'s Monroe, Mich. plant where, J. E. Cooper reports in *Plating* (1951), arrangements were provided in the waste treatment installation for the recovery of ferrous sulfate from the waste steel pickling liquor at the Rouge plant. The recovered salt was to serve, if desired, as a reducing agent for hexavalent chromium

Ferrous sulfate, heptahydrate ($FeSO_4.7H_2O$), recovered as green crystals or copperas from waste pickle liquor, is sold by a number of companies for farm use or for conversion by pigment manufacturers to red or yellow oxides.

In that respect, a report by E. D. Martin in *Iron Age* (1948) describes the process developed at the Inland Steel Co., for separating ferrous sulphate from liquor as the monohydrate ($FeSO_4.H_2O$), a stable form of iron sulfate at room temperature, weighing only 62.5 percent as much as copperas but containing the same amount of ferrous sulphate. The process involves evaporation of the spent pickling solution heated at 220°F. in which the sulphuric acid concentration is brought to 32 percent by volume.

The use of the sulphonated polystyrene resins as an ion exchange medium for removal of ferrous ions in a phosphoric acid pickling bath at the Electro-Motive Division of General Motors Corp. was reported by D. Milne in the 39th *Ann. Proc. A. E. S.* Removal of the ferrous ion in this process reduced the problem of interference, a condition previously encountered because of the formation of insoluble ferric phosphate from the accumulated iron salt and the creation of a heavy sludge. The exchange resin does not remove the ferric ion, so that the iron in the bath must be maintained in the reduced ferrous state. Reduction is achieved by the formation of hydrogen on the metal being pickled or by the addition of scrap iron to the pickling process. Satisfactory operation, it is claimed, will be attained with concentrations of 1 to 2 percent of ferrous ion and 0.1 percent of ferric ion.

The phosphoric acid, which would otherwise be lost as iron phosphate, is thereby conserved, thus making this pickling treatment method comparable in cost with the sulfuric acid pickling process. C. F. Paulson in *Iron Age* (1950) cites the following comparative costs (in cent per square foot) for pickling operations; sulphuric acid 0.2529 cent; sulphuric acid pickling, phosphate coating 0.3460 cent; ordinary phosphoric acid pickling 0.6195 cent; ion exchange phosphoric acid pickling 0.2175 cent.

Advantages claimed for this process (ion exchange) include: reduction in the number of dipping and rinsing tanks, hence less floor space, compared to the sulphuric acid pickling cycle; application of a rust resistant adherent coating on the surface of the steel; and elimination of corrosion of structural parts of building by acid fumes.

SHOP PROBLEMS

ABRASIVE METHODS SURFACE TREATMENTS CONTROL
ELECTROPLATING CLEANING PICKLING TESTING

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Activating Bright Nickel

Question: When passing nickel plated steel handbag frames from activating tank, 175 gallon capacity, containing sodium cyanide solution (½ oz. per gallon), to brass plating tank, the frame (1) turns red, and (2) after about 4 seconds develops a good brass plate. On the other hand, when this same type of work is transferred from the bright nickel tank to the brass plating tank, it immediately develops a good brass plate. Is there something wrong in the first process?

K. W.

Answer: The sodium cyanide activating solution should be 8 oz./gal. It is presumed that you are activating cathodically, of course, and it is possible that the low concentration is the source of the trouble.

Ordinarily, the brass solution has sufficient activating power so that a prior activation of the bright nickel is unnecessary. Since your results confirm this, why activate?

Cobalt Plating

Question: Our company is a subscriber to your magazine. We are interested in obtaining from you, through METAL FINISHING's Reader Service, any electroplating baths for cobalt and cobalt-base alloys you may have.

D. W. B.

Answer: A rather large number of cobalt and cobalt alloy plating solutions have been developed during the last 40 years. The literature on the subject is too extensive for us to list.

Some formulas and operating conditions will be found in the book, "Modern Electroplating," edited by Allen G. Gray, in the chapter on Cobalt. Many papers have been published in the Transactions of The Electrochemical Society and its Journal and a number of patents have been issued on cobalt and various cobalt alloy baths. It is suggested that these sources be examined for complete details.

Molybdenum Plating

Question: Is there any information on plating molybdenum on steel, especially medium to high carbon steels? If you have any such information, will you please forward same or advise where such information may be secured.

R. W. S.

Answer: A variety of molybdenum baths have been reported: acetate, fluoride, formate, phosphate, propionate, and sulfate solutions of molybdic oxide, alkaline, neutral and acid. However, the efficiencies of these solutions are quite low, in the neighborhood of 1-2%, so that none of these processes could be considered commercial.

For details on these baths, most of which have also been the subject of patents, we can refer you to:

Ksycki & Yntema. J. Electrochem. Soc., **96,** 48 (July 1949).

Price & Brown. Trans. Electrochem. Soc., **70,** Preprint No. 6 (1936).

Photostatic copies of these papers may be obtained from the New York Public Library.

Preparation of high carbon steel for plating will be found in the METAL FINISHING GUIDEBOOK.

Barrel Silver Plating

Question: Can you give me any data on barrel silver plating? I would like the procedure on brass.

J. A. P.

Answer: 1. Degrease in solvent and clean in alkaline cleaner. Then acid dip or bright dip the parts, as required.

2. Strike at 6 volts in a solution of 1 oz./gal. silver cyanide and 8 oz./gal. sodium cyanide or potassium cyanide.

3. Transfer cylinder, without rinsing, into silver plating solution of standard formula.

The above procedure requires two tanks, one for the strike and one for the plating solution, but only one cylinder. It has the advantage that the plating bath can be of the concentrated, high speed bright types recently placed on the market. However, if only light deposits are required, the articles may be struck at high voltage and then plated at about 2-4 volts in a solution of 2 oz./gal. silver cyanide and 8 oz./gal. of either sodium or potassium cyanide. In this case, the cylinder must go into the solution live in order to avoid immersion deposits of silver, which would be non-adherent.

Passivating Stainless Steel

Question: We use the METAL FINISHING GUIDEBOOK-DIRECTORY and are interested in obtaining additional information regarding the passivation of stainless steel 304, not included in the Handbook.

C. O. M.

Answer: The 300 series stainless steels are passivated by soaking in 20% by volume solution of nitric acid at about 120 deg. F. for 20 minutes. For the 400 series, 2-4 oz./gal. potassium dichromate are added to the nitric acid solution.

Adhesion of Copper to Nickel

Question: As manufacturers of phonograph records (microgroove), we are working with bright nickel baths. We find some difficulties in the adhesion of the copper to the bright nickel deposit.

M. L. C.

Answer: It is important, when applying deposits over bright nickel, that the nickel is not permitted to become passive. The shell should be transferred

from the nickel tank to the copper without any delay.

Passive nickel can often be reactivated by a direct current (cathodic) treatment in a solution of about 8 oz./gal. sodium cyanide, at 6 volts. After this treatment, the shell is rinsed, dipped in a 10% by volume sulfuric acid solution and, after another rinse, is immersed in the acid copper bath, with immediate electrical contact to avoid formation of a non-adherent immersion copper film.

Cadmium Plating

Question: The cadmium metal in our plating bath continues to run high in spite of the fact that we have taken out more than half of the anodes. Everything else about the bath seems to be easy to control except this high cadmium content. The cadmium has never run below 4.5 oz./gal. and, at present, it is running at about 5.5 oz./gal. The cyanide is about 18 oz./gal., the caustic at 3.5 oz./gal. and the sodium carbonate at 3.9 oz./gal.

How can I check the current density going through the anodes to be sure that it is running at 20 to 30 amps. per sq. ft. and how is this current density related to, say, a load at the cathode being plated at 40 amps. per sq. ft.?

J. E. J.

Answer: To check the anode current density, place a piece of cardboard underneath the hook of the anode in order to insulate it from the anode rod. Then connect the leads of an ammeter between the hook and the anode rod. The current drawn by the anode can then be read on the meter. As long as the anodes do not turn black due to polarization, you needn't worry about the anode current density.

Since the solution is being maintained by chemical analysis, all the cadmium anodes can be removed and replaced with steel sheets until the metal content drops to the desired figure.

Anodizing Aluminum

Question: I have a small aluminum anodizing shop and would like to work on another type of anodizing which is relatively new, concerning which I do not have sufficient information. This process is known in Spanish as "Ematalt," in Italian as "Ematal" or "Ossicoloracion," and in English I do not know the exact name, but it is perhaps "Ematal" or "Anodic Enameling of Aluminum."

As you probably know, it consists of giving the aluminum a porcelain-like appearance, in white or various colors, by means of hot anodizing, at 120 volts, using oxalic acid as an electrolyte, with dissolved titanium salts (possibly titanium potassium oxalate) which, on hydrolyzing, are absorbed by the oxide of aluminum, thus giving it the porcelain look. Possibly, after this it is submerged in some special colorant to give it another color, otherwise it would remain white.

This is all the data I have, and, as you can see, it is insufficient. I would greatly appreciate any data or information you could send me regarding this.

A. R. L.

Answer: The original Emetal process, which was patented by Schenk about 17 years ago, called for the use of direct or alternating current in a solution of inorganic and organic compounds containing a titanium salt. A suggested formula was the following:

Titanium potassium oxalate	5% by weight
Citric acid	1½% "
Glucose	2% "
Phosphoric acid	0.6% "
Water	Balance
Temp.	75 deg. C.
Voltage (alternation)	110 V.
Amperage	5-6 amp./sq. dm.

The coating can be dyed and sealed as usual.

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Patents

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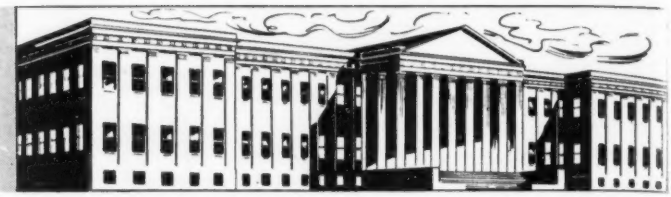

Oxalate Coatings on Chromium Alloys

U. S. Patent 2,774,696. *Dec.* 18, 1956. *R. C. Gibson, assignor to Parker Rust Proof Co.*

The method of coating a metal of the class consisting of chromium and chromium-nickel-iron alloys in which the major content is a non-ferrous metal selected from the group consisting of nickel and chromium, said method comprising the step of contacting at a coating temperature the metal surface with an aqueous solution comprising as the essential coating-producing ingredients iron oxalate and the chloride ion wherein ferrous iron is in the range of about 0-0.8 per cent, wherein the total iron is at least about 0.5 per cent and includes at least enough ferric iron to increase the solubility of ferrous iron so that the sum of the ferrous and ferric iron is equal to at least 0.5%, wherein the solution is at least substantially as acid as that produced by an aqueous solution of iron oxalate alone, and wherein the proportion of chloride ion is at least the proportion which is substantially proportional to the percentage of chromium in the metal with reference points as follows:

1 per cent chloride at 15 per cent chromium,

11 per cent chloride at 100 per cent chromium.

Copper Bath Brightener

U. S. Patent 2,774,728. *Dec.* 18, 1956. *C. J. Wernlund, assignor to E. I. du Pont de Nemours & Co.*

An aqueous copper cyanide bath for electrodepositing a bright, ductile, copper electroplate, said bath containing about 5-20 oz./gal. of copper cyanide, about 0.006-0.06 oz./gal. of potassium antimonyl tartrate and methylene-bis-(naphthalene sulfonic acid).

An aqueous copper cyanide bath for electrodepositing a bright, ductile copper electroplate, said bath containing about 5-20 oz./gal. of copper cyanide, about 0.05-10 oz./gal. of an alkali metal thiocyanate and about 0.006-0.6 oz./gal. of potassium antimonyl tartrate.

Automatic Polishing Machine

U. S. Patent 2,775,073. *Dec.* 25, 1956. *J. H. Ingersoll, J. A. White, W. W. Kovalick, M. Hegyi, N. A. Ruisard and L. L. Levitt, assignors to Borg-Warner Corp.*

In a polishing machine having a polishing medium, the improved means for effecting and controlling the engaging pressure between an article and said polishing medium comprising the combination of means responsive to fluid pressure and resilient pressure means both being adapted for exerting forces on said article to move it toward said polishing medium, and means including valve means for varying said fluid pressure to control the forces exerted by said fluid pressure responsive means and said resilient pressure means.

Method of Treating Pickle Liquors

U. S. Patent 2,775,508. *Dec.* 25, 1956. *A. M. Thomsen.*

A method for the treatment of iron-bearing sulfate spent pickle liquor for the recovery of iron values therefrom and for the manufacture of ammonium sulfate, said method including the steps of forming a reagent solution consisting essentially of a mixture of a substantially iron-free aqueous solution of ammonium sulfate and the reaction products of ammonia and carbon dioxide, adding a slight excess of said reagent solution to pickle liquor to precipitate principally as iron carbonates the major part of the iron resident in said pickle liquor, removing the said iron precipitate by filtration to provide a solution of ammonium sulfate, dividing said ammonium sulfate solution into two parts, recirculating one of said parts to the first mentioned step for the production of said reagent solution, and treating the other of said parts for the separation of ammonium sulfate therefrom in crystalline form.

Flame Sprayed Coating

U. S. Patent 2,775,531. *Dec.* 25, 1956. *E. T. Montgomery, A. P. Welch and J. L. Bitonte, assignors to The Ohio State University Research Foundation.*

A process of plating a metal surface which comprises forming small particles of metal selected from the group consisting of aluminum, iron, nickel and cobalt, forming small particles of a metal oxide selected from the group consisting of alumina, magnesia and zirconia, mixing the metal and the metal oxide particles together, sintering said mixture, reducing the sintered mixture to particles of powder of extremely small size and flame-spraying the mixed sintered particles on the surface to be coated and thereby heating said particles of powder to a sintering temperature of at least approximately 2,100°F.

Treatment of Tinplate

U. S. Patent 2,775,535. *Dec.* 25, 1956. *W. D. Poole, assignor to Bethlehem Steel Co.*

In a method for treating electrolytic tinplate in strip form the steps comprising heating strip to a temperature above the melting point of tin, cleaning the strip cathodically in an aqueous alkaline solution of sodium carbonate in which the concentration of alkaline compound is approximately 0.5% to 5.5% at a current density of from 3 to 30 amp./sq. ft. and at a temperature of from 160°F. to 210°F. for a period of time in excess of 0.5 second, rinsing the strip with water and then passing the strip through a chromic acid solution having a CrO_3 concentration of from 0.1% to 1.0% at a temperature of from 150°F. to 200° F., and rinsing the strip.

Belt Sander

U. S. Patent 2,775,853. *Jan.* 1, 1957. *B. J. Jones.*

In a belt sanding and finishing apparatus adapted for treating articles having an irregularly shaped con-

figuration, at least one pair of spaced-ly and resiliently mounted pulleys; an endless belt passing over said pulleys, said belt having an abrasive material disposed thereon, means for biasing said pulleys to a tension-producing position relative to said belts, means for rotating one of said pulleys, at least one workholder adapted to receive said articles and arranged for movement relative to said belt, said workholder having a cam surface corresponding to said configuration; means mounted adjacent one of said pulleys and spatially movable therewith for engaging said cam surface, whereby said pulley and said sanding belt are guided into proper sanding relationship relative to each portion of said configuration, and means for moving said workholder relative to said belt.

Forming Plated Articles

U. S. Patent 2,776,255. *Jan.* 1, 1957. *M. B. Hammond and G. B. Bowman, assignors to Rockwell Spring and Axle Co.*

The method of making formed, plated articles, which comprises electroplating a coating of nickel on a polished flat steel strip, electroplating a coating of zinc on the nickel coating, applying a phosphate coating and a drawing compound to the zinc coating, forming the coated strip into an article, subjecting the formed article to an anodic alkaline cleaning operation to remove the phosphate coating and drawing compound, dissolving off in an acid solution from the formed article the zinc coating containing imperfections resulting from the forming operation, subjecting the nickel coated formed article to an anodic electropolishing operation in an acid aqueous bath containing phosphoric acid to remove residue resulting from dissolving off the zinc coating, subjecting the nickel coated formed artcle to a cathodic alkaline cleaning operation to activate the nickel, contacting the formed article with an acid, and electroplating a nickel coating on the formed article.

Copper Plating Cylinders

U. S. Patent 2,776,256. *Jan.* 1, 1957. *K. P. A. Eulner and J. F. Mueller.*

An improvement in the art of manufacturing an intaglio printing cylinder wherein a copper coating is electroplated on the smooth polished periphery of a base cylinder while it is rotating in a copper depositing bath comprising: polish-brushing the copper coating on the periphery of the rotating cylinder with a flexible brass-bristle brush for a substantial time during the end portion of the deposition period and while copper is being deposited on the cylinder to produce a smooth polished cylinder substantially ready for the etching operation.

Metalizing Non-Conductors

U. S. Patent 2,776,915. *Jan.* 8, 1957. *G. W. von Oosterhout and A. Bol, assignors to Hartford National Bank and Trust Co.*

A method of applying a layer of silver to an object comprising the steps, heating said object to a temperature of about 150°C. to 300°C., and applying to selected surface portions of said object only a silver salt of a fatty acid selected from the group consisting of lactic and butyric acid while said object is maintained at said temperature to form a conductive silver layer at those surface portions.

Corrosion Preventive

U. S. Patent 2,776,917. *Jan.* 8, 1957. *M. J. Shnitzler, T. P. Norton and R. McDonald, assignors to The Gillette Co.*

A composition for application to a metal surface to retard the corrosion thereof which comprises an inert carrier and as compounds providing a corrosion-inhibiting effect a member

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of the class consisting of carboxylic acids and bivalent metal salts thereof and a member of the class consisting of aromatic carboxylic acids and bivalent metal salts thereof, at least one of said members being present as a bivalent metal salt, the aromatic member being present in an amount at least equal to the amount capable of saturating the carrier alone.

Bright Silver Bath

U. S. Patent 2,777,810. *Jan.* 15, 1957. *B. D. Ostrow, assignor to Elechem Corp.*

An electrolytic bath for depositing silver comprising an aqueous solution of silver cyanide containing a soluble selenium compound in which the selenium has a valence of-2, the amount of selenium present in said bath being .0001 to .01 gram per liter.

Rotary Brush

U. S. Patent 2,778,047.*Jan.* 22, 1957. *N. E. Nielsen, assignor to Newark Brush Co.*

A rotary brush of the character described having a pair of disc shaped plates of substantially the same diameter, one plate having an inwardly projecting circular shoulder portion radially spaced a substantial distance from its outer rim and forming a principal brush support, a relatively narrow strip of strong material having groups of staples carrying brush material fastened thereto. said strip being in circular form and fitted onto said shoulder portion support, the other plate having a narrow shoulder and being fastened to the innerside of said shoulder portion, each plate having fingers which project into the brush material on the final assembly of the brush structure.

Rotary Brush

U. S. Patent 2,778,048. *Jan.* 22, 1957. *N. E. Nielsen, assignor to Newark Brush Co.*

A rotary brush of the character described, having a pair of disc shaped plates, one main plate only having an inwardly projecting circular hub portion radially spaced a substantial distance from the outer rim of the plate, wire brush material positioned around said hub portion and extending outwardly beyond the disc edge, staples having ends going through said inwardly projecting hub portion for holding the brush material to the hub, the staple ends being bent over on the inner side of the hub portion, while the other plate is fastened to the hub portion of the first mentioned plate so as to form a backing for the brush material.

Contact Wheel

U. S. Patent 2,778,166. *Jan.* 22, 1957. *W. J. Cosmos.*

A removable rim for a contact wheel comprising an endless flexible belt; a series of flexible ribs spaced around the inside of the belt, secured thereto and extending across the same and short radial distances inwardly therefrom to inner edges parallel with and separate from one another; each flexible rib substantially consisting of a fabric-reinforced member impregnated with rubberlike material, having a tubular inner edge portion, a flat portion extending outwardly therefrom and an outer portion the cross sectional area of which expands from the flat portion, said several portions being substantially as long as the rim is wide; and a rigid member secured to each inner edge for securing the same to a hub structure.

Rhenium Plating Carbon

U. S. Patent 2,778,786. *Jan.* 22, 1957. *H. Pearlman, L. Silverman and C. A. Smith, assignors to the United States of America.*

A process for securely bonding a coating of rhenium to a carbonaceous part comprising electroplating said part with rhenium and immediately heating said plated part in a vacuum to at least 1,100°C. whereby said rhenium forms a protective coating over said carbonaceous part with good bonding strength at temperatures as high as 1,000°C.

Conversion Coating

U. S. Patent 2,777,785. *Jan.* 15, 1957. *L. K. Schuster and A. L. Baldi, Jr., assignors to Heintz Manufacturing Co.*

A stabilized solution consisting essentially of chromic acid, a reducing agent for the chromic acid, and water, the reducing agent being one that at 80°F. co-exists in dissolved condition with the chromic acid for at least about one day without producing a precipitate, the solution also containing about 0.01 to 0.5% of a dissolved manganese compound.

Iron-Zinc Alloy Bath

U. S. Patent 2,778,787. *Jan.* 22, 1957. *F. W. Walt, assignor to The British Iron & Steel Research Association.*

A method for the electrodeposition of iron-zinc alloys in which the bath contains a source of iron and zinc ions, an ammonium salt, an aliphatic hydroxy-acid supplying a chelate group to the ferric ion and an alkali metal chloride different from said ammonium salt in proportions sufficient respectively to prevent decreasing acidity at the cathode, to prevent substantial precipitation of ferric hydroxide from the bath and to prevent the anode becoming passive.

Bright Copper Plating

U. S. Patent 2,778,788. *Jan.* 22, 1957. *D. R. France.*

A copper plating solution brightener comprising the following in the following proportions, four ounces molybdic acid, one ounce lead tartrate, five grams ammonium acetate, one hundred cubic centimeters ammonium hydroxide, two hundred centimeters wetting agent, four grams sodium stannate, four grams cadmium oxide, one half ounce sodium cyanide, one half ounce sodium chloride, eight ounces sodium hydroxide and water sufficient to make one gallon of brightener.

Anodizing Magnesium

U. S. Patent 2,778,789. *Jan.* 22, 1957. *W. McNeill, assignor to the United States of America.*

A method of producing hard and compact protective coatings on magnesium and magnesium-base alloys which comprises making the magnesium articles the electrodes and electrolytically treating them under progressively increasing potential to a selected terminating voltage of any amount up to just over 300 volts, depending on the quality of the coating desired, in an aqueous solution whose solute ingredients are a chromate, a phosphate and a fluoride that yield non-metallic cations only, and whose pH is maintained in a range of about 5.5 to 9.0 with an alkalinity agent yielding non-metallic cations only.

Decorating Anodized Aluminum

U. S. Patent 2,778,790. *Jan.* 22, 1957. *C. J. Sobol, assignor to Croname, Inc.*

The method of decorating unsealed anodized aluminum comprising print-

ing on the unsealed anodized surface with water insoluble but water permeable vehicle and water insoluble dye, then, before removing excess vehicle from the printed surface, hot water sealing through the water permeable, insoluble vehicle left on the sealed surface of the aluminum and then after sealing, removing the vehicle.

Buffing Wheel and Method of Making Same

U. S. Patent 2,779,142. *Jan.* 29, 1957. *J. C. Wisnieski, assignor to Lyon, Inc.*

A method of forming a unitary buff including a multi-ply fabric outer annular section and a central circular supporting fabric gripping section.

Removing Copper from Steel

U. S. Patent 2,779,674. *Jan.* 29, 1957. *A. T. Cape, assignor to Superweld Corp.*

In a method of treating copper-brazed steel parts to dissolve the copper without attacking the steel, the step which consists in treating the parts with nitric acid and a solution containing gold ions in an amount effective to inhibit the attack of the steel.

Antimony Plating Bath

U. S. Patent 2,779,725. *Jan.* 29, 1957. *C. F. Smart, assignor to General Motors Corp.*

An antimony plating bath consisting essentially of an aqueous solution of dibasic ammonium citrate, antimony potassium tartrate and a compound selected from the group consisting of boric acid, fluoboric acid and soluble salts of fluoboric acid, the concentrations of the several ingredients per liter of water consisting essentially as follows: 60 to 100 grams of dibasic ammonium citrate, 8 to 12 grams of antimony potassium tartrate, and 8 to 15 grams of the compound selected from said group.

Automatic Conveyor for Hollow Articles

U. S. Patent 2,780,229. *Feb.* 5, 1957. *J. V. Davis, assignor to The Udylite Corp.*

In a work-handling apparatus, a tank, a rail over said tank, a work carrier hook suspended from and slidable on said rail for supporting work in said tank, an articulated parallelogram work carrier structure suspended from said hook, said structure including an arm pivoted between its ends to said hook and having two side members depending from said arm at opposite sides of its pivot point, and means for imparting vertical movement to one of said depending members, whereby said structure is rocked on a horizontal axis without substantial horizontal sway.

Decorative Metal Plating

U. S. Patent 2,780,591. *Feb.* 5, 1957. *S. S. Frey, assignor to Oakite Products, Inc.*

A method of producing a decorative finish upon a metal object selected from the group consisting of copper, brass, and steel objects which comprises anodizing such metal object in an alkaline aqueous silicaceous solution having a pH of between 10.25 and 12.2 to produce an invisible anodic film thereon and thereafter electroplating such anodized object still carrying such anodic film in a bright nickel plating bath until a patterned nickel plate is produced.

Chromate Conversion Coating

U. S. Patent 2,780,592. *Feb.* 5, 1957. *R. M. Wick and R. Schneidewind, assignors to Bethlehem Steel Co.*

A process of forming a non-metallic coating on the surface of a metal article which comprises electrolyzing a metal article having a surface material of corrodible base metal in an aqueous solution consisting essentially of chromic acid (100 to 400 grams per liter) and a compound of the class consisting of boric acid and the alkali metal and alkaline earth metal salts of boric acid, said compound being present in an amount of from 8 grams per liter to saturation with said metal article acting as the cathode.

Descaling Titanium

U. S. Patent 2,780,594. *Feb.* 5, 1957. *J. J. Dailey, assignor to Temco Aircraft Corp.*

A method of removing oxide coatings from an article of titanium and titanium base alloys comprising immersing said article as a cathode in an electrolytic bath and passing an electric current between said article and an anode, said bath consisting essentially of an aqueous solution of hydrofluoric acid, nitric acid, sulfuric acid and a sulfate selected from the group consisting of the ferrous sulfate and aluminum sulfate.

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ABSTRACTS

Composition and Formation of Black Oxide Coatings on Steel

I. W. Krotow: *Shurnal Fisitscheskoi Chimii* (Journal Physical Chemistry—Russia). Vol. 28, No. 7, p. 1327.

By the treatment of iron and steel in hot concentrated caustic alkali with the additions of oxidizing agents (sodium nitrate), a protective oxide coating is obtained. From the analytical investigation, the composition of this was found to be Fe_3O_4. The mechanism of the black oxide coating formation appears to be an electrochemical process, in which the surface of the iron which is already covered with an oxide skin acts as the cathode, the parts of the metal surface which are still bright acting as the anode. A scheme for the anodic and the cathodic procedure is presented.

Anodizing of Aluminum and Alloys

F. Sachi: *Alluminio* (Italy). Vol. 24, No. 1, p. 5.

The author discusses the special characteristics of the new processes for the formation of a thick and hard anodized coating on the surface of aluminum and its alloys, coatings of this nature being applicable for mechanical utilization. Laboratory tests conducted at the I.S.M.L. have developed the best treatment procedures with a special type of sulfuric acid bath. The characteristics of the oxide coatings obtained were compared with American and English test results. Special attention is drawn to the noteworthy wear resistance of the treated parts compared with a reduction of the fatigue strength.

Formability of Anodically Oxidized Pure Aluminum

W. Koehler: *Werkstoffe und Korrosion*. Vol. 6, p. 169 (1955).

The author investigated the influence of various coating formation conditions on the formability and shaping characteristics of the anodized oxide coating on aluminum metal. Particularly, attention was given to the tendency of the oxide coating towards crack formation with tensile and deep drawing stressing. By means of various test procedures, it was established that anodized oxide coatings on aluminum can be utilized as an auxiliary means for the indication of local stress peaks in light metal constructional parts.

Poor Adhesion of Nickel Plate and its Avoidance

O. A. Stocker, A. Korbelak and S. Carranos: *Metalloberflaeche*. Vol. 10, No. 1, p. 7.

Possible causes of the defect may be as follows. First the cleaning process needs scrutiny. The cleansing medium used should be tested for correctness of concentration, temperature, and current density, and for the presence of chromic acid or other impurities. If hexavalent chromium is present, this can be removed with sodium hyposulfite. The rinsing water must also be clean. Insufficient cleaning can be indicated by water drop formation from a too-low concentration cleaner. The current density can also be too low.

Defects can arise with the acid dip. The dipping should be conducted in acids of a suitable concentration, with water rinsing as the last process before plating. Unsuitable acid dipping can show up as spots or films from dipping in over-concentrated acids or by insufficient neutralization in too-weakly concentrated acids. Hydrochloric acid is often better suited than sulfuric acid for this dip. According to the nature of the material, the reverse may also be true.

Current interruption is another frequent cause of poor adhesion. This should be avoided, as laminated deposits will not adhere, particularly if the plated part is bent. Refinished ware should be cleaned before plating, but activation of the old nickel surface is possible. Two different types of activation are possible: The part can be placed in a cyanide activator for 30-60 seconds at 21-27°C., using 89.9 g./l. of sodium cyanide. The voltage should be at least 6 volts as, otherwise, there will be no vigorous gas generation on the part to be activated. Sometimes a short anodic treatment can be given before the cathodic treatment. Activation is also possible in the Wood chloride pre-nickling bath.

Overcleaning can also be another contributory cause. After cleaning, the surface of the part should be tested for the presence of films or spots of concentrated cleaner. Too-high a current density should be avoided, particularly with anodic cleaning. Impurities in the nickel bath may give trouble. The bath should be investigated for impurities such as lead, chromium, or organic compounds foreign to the bath. Metals such as lead can be removed by selective purification and chromium can be removed by treatment at a high pH, and often by the additional use of potassium permanganate and lead carbonate. Organic constituents are removed with activated carbon, partly with and partly without previous oxidation with potassium permanganate, hydrogen peroxide, or sodium hypochlorite, according to test. Passive basis metal is a frequent cause of bad adhesion. Activation can be given in a Wood pre-nickeling bath, or electrolytic treatment in acid baths, for stainless steel, heat resisting steel, and nickel alloys. Porous basis metal requires thorough rinsing for the removal of any trapped cleaning agents, acids, etc.

Quality Testing of Anodized Coatings

F. Baumann and R. Lattey: *Aluminium* (Germany). Vol. 31, p. 199 (1955).

The physical characteristics of anodized coatings, such as coating thickness, corrosion resistance, wear resistance, porosity, and electrical resistance, are dependent on the working conditions which, in practice, cannot be held so constant that the same good quality coatings are always obtained. For operational control it is accordingly necessary to have available test methods which will allow of the quality judging of the coatings. The most certain way to determine the coating thickness is by microscope measurement, preferably in a dark field with 500 magnification. The microscope determination can also be conducted by the differential process, which works without difficulty, although not so accurate, and which can only be applied to transparent coatings of objects of limited size. Details are given of conducting this determination.

A determination of the coating thickness which is sufficiently accurate for ordinary technical purposes is obtained with the Foerster Isometer, which works on the electro-inductive principle. Testing of the corrosion resistance of the coating is conducted either

in an artificial industrial atmosphere (action of CO_2/SO_2 atmospheres saturated with water vapor with subsequent aeration or in acetic or oxidizing sodium chloride solutions. The latter gives results which depend both on the coating thickness and on the composition of the basis metal.

The wear resistance of the anodized coating is tested in such a manner that the parts are traversed on a movable support cradle over a hard metal pointer, at a given pressure. The number of traverse movements required for rubbing through the coating, will lie between 1,000 and 30,000 per micron, according to the hardness and coating thickness. In anodizing, softer coatings are produced with alternating current than with direct current. Dye solutions of anthroquinone and of the triazo dyes are used for testing the porosity. Sealed coatings should show no coloration within a determined time. The electrical characteristics of the anodized coating are determined by measurement of the break-through voltage. The ohmic resistance is measured with the resistometer. The voltage is determined which is necessary to allow a current of 100 ma. to flow through the coating (coatings below 5 microns are not measurable).

Plating Racks

H. Krahiruss: *Metallwarenindustrie und Galvanotechnik.* Vol. 45, No. 9, p. 448.

The lower the throwing power of a plating bath, the more attention needs to be given to the correct design and construction of the plating racks and, particularly in this case, to the assurance of adequate contact. Non-uniform current distribution must also be given due consideration in designing racks. The deviation of the current lines of force in the plating bath will give rise to concentration of these lines of force at the edges and corners and this effect will be aggravated with strongly recessed parts. Consequently, in baths with a poor throwing power, it will be necessary to make provision for auxiliary anodes to overcome this defect and to ensure a reasonably uniform deposit. Plating is fairly simple in the nickel bath. Large parts are generally hung individually with copper or brass wire. The ware should hang parallel to the anodes and should not overlap each other. Small parts are best racked by spring contacts of the clamp type. If clamping is not possible, and they are able to make sufficient contact by their own weight, the parts can be hung on racks provided with a series of hooks on each side, from top to bottom. For larger and heavier parts, stout wire projections inclined upwards can be used as the hanging supports.

Where hollow parts need to be plated both inside as well as out, an internal anode will be required; this is arranged on the rack with suitable connection so that, when the part is racked and placed in the bath, current will automatically flow to the auxiliary internal anode. Parts of large surface area, such as large sheets for example, should be sprung between the connection on the rack, so that the sheet bends outward appreciably and is curved. The curved part in the middle will be nearer the anode and so will compensate to some extent, for the lower throwing at the center which would otherwise occur.

Nickel, silver, and cadmium baths have good throwing power and do not present very great difficulties with racking. Chromium baths have very poor throwing power and, as high current densities are used, robust racks are required and good contact must be ensured. Screening wires also must often be used with the racks to avoid any edge effect and graying of the chromium at the edges.

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Mechanical Bend-Descaling of Wire Rod

C. Eisenhuth: *Stahl und Eisen.* Vol. 75, No. 17, p. 1092.

Tests were conducted on the possibilities of mechanical descaling of wire rod. The scale is brittle while the steel is ductile. If the steel surface is elongated then the scale must lift off. This removal started with an elongation of 3-5% and, at 8-9%, the greater part of the scale had fallen off, but it was only at 12% that the steel surface was completely clean. It is from these facts that the dimensions of the bend-descaling rollers can be calculated. Descaling machines which are on the market have bend-roller diameters of 65 mm. and, accordingly, can only achieve a coarse descaling. The mechanical descaling gave weight losses of 6.1 to 12.01 kg./ton of wire, on the average 8.7 kg./ton.

Chemical descaling gave weight losses of 9.4 to 16.3 kg./ton. wire with an average of 12.4 kg./ton. The difference amounts, on the average, to 3.7 kg./ton. The surface of the wire descaled by the two processes is naturally different. The surface of the mechanically descaled wire is strongly fissured with outstanding points. This surface must be covered with a lubricant. It is considered that mechanical descaling can be applied to a wide variety of wire-drawing operations but not to all phases.

Cleaning by Supersonics

M. R. Buvet: *Metaux.* No. 361, p. 363 (1955).

In industrial cleaning by supersonics, the parts are hung in a cleaning bath, then supersonic vibrations applied. Apart from the chemical action. a mechanical cleaning effect is also obtained by virtue of the vibrations. In practice, there are two types of supersonic cleaners. At the moment cleaning is limited mainly to the smaller parts, but developments are proceeding by which larger parts can be treated.

New Surface Treatments for Nickel Alloys and Stainless Steels

Beiztechnik. Vol. 5, No. 1, p. 5.

Processes are described which have been placed into operation at a French wireworks. A wide range of metals and alloys are handled at this plant comprising nickel, Monel, Inconel, copper-nickel, nickel-chromium, nickel-chromium-iron, iron-chromium-aluminum and the normal stainless and heat-resisting steels. Special measures are required for the surface treatments, because the products must be drawn with absolute accuracy. The pickling and surface pretreatments before the cold-forming are conducted in fairly active-working baths. The following solutions are used for the treatment baths:

Solution 1: Hydrochloric acid 30%, nitric acid 2%, water 68%, 80°C.

Solution 2. Sulfuric acid (65° Bé) 10%, water 90%, 70-80°C.

Solution 3. Sulfuric acid. 10%, nitric acid 0.5%, water 89.5%, 70-80°C.

Solution 4. Nitric acid 15%, hydrofluoric acid (70%) 2-4%, water 83-81%, 50-60°C.

Solution 5. Soda 20%, potassium permanganate 7%, water 73%, 95-97°C.

Solution 6. Nitric acid 27%, water 73%, room temperature.

Solution 7. Nitric acid 20%, water 80%. Temperature up to 50°C.

Solution 8. 12% alkaline solution with activating additions, 95-97°C.

Solution 9. Saturated solution of ammonium chloride in water, 80-85° C.

Solution 10. This bath is a complex on the basis of sodium and lithium soaps and chlorinated wax in a 12% solution, 70°C.

As the surface treatment is given at various finishing stages, these dips must be installed central to the other working operations. Two handling lines are provided, one for the treatment of wire bundles and strip, the other for tubes and rods.

Improvement of Light Fastness of Dyed Anodized Coatings by Sealing Treatment

H. Benninghoff: *Deutsche Graveur und Stempelzeitung.* Vol. 80, No. 7, p. 104.

Anodized coatings on aluminum which have been produced in sulfuric acid electrolytes, must be sealed. The normal sealing process consists in treating the anodized parts in hot distilled water at 90°-100°C. or with solutions of hydrolyzable chemicals. The sealing effect is based on the swelling and contracting properties of the oxide coating. The author discusses the water sealing process, the nickel/cobalt-acetate, bichromate, and the Glauber's salt sealing processes.

The new sealing process developed by Durand and Huguenin A. G. of Basle is then described, this process offering certain advantages as compared with older processes. The new process is particularly favorable as regards the light fastness of the sealed coatings. By means of data and tables it is shown how far and with what dyestuffs an improvement in the light-fastness is achievable.

The sealing process is based on the fact that, in place of the normal sealing process, an after-treatment of the anodized and/or dyed part is carried out with either lead, copper, zinc, or chromium salts. With many dyestuffs used for anodized aluminum, by sealing with these metal salts, a considererably higher last-fastness is obtained than with the normal water or nickel-cobalt acetate sealing.

If dyed surfaces are treated with, for example, 2-5 g./l. lead acetate, copper sulfate, zinc chloride, or chromium sulfate for 30 minutes at boiling, then rinsed as usual and the dried, higher light-fastnesses of the color, are obtained. Tables of the values obtained are given in the text.

Metal Degreasing

H. Krahirus: *Metallwarenindustrie und Galvanotechnik.* Vol. 45, No. 5, p. 222.

The author first discusses the nature of the oils and greases present on metal parts, which have to be removed, and considers the mode of removal, involving variously solvent action and saponification. Apart from other consideration, the nature of the oil and grease present will influence the degreasing method to be applied. Solvent degreasing processes are then discussed in detail. Degreasing with boiling alkaline baths and emulsion degreasing are then dealt with. With the latter, the cleansing mediums used, apart from emulsification, also have a peptizing action. The surface forces of the dirt and grease particles, are raised by the peptizing which prevent flocculating out.

In electrolytic degreasing, the actual

electrolyte used does not differ greatly from normal degreasing. Caustic alkalies provide the necessary conductivity and additions are emulsifying agents and wetting agents. Soaps are less used as additions because the conductivity of the electrolyte is reduced. It is also not advisable to have soap foam in the electrolytic degreasing bath because the hydrogen can become trapped in the foam and sparking when the ware is lifted off the busbars, might ignite this. It is stated that the fat is saponified by the nascent alkali formed at the cathode but this does not appear probable. Considerable hydrogen is produced and this serves to force the grease off the metal surface. With some metals such as steel, the hydrogen may introduce embrittlement and poor adhesion of the deposit by becoming occluded in the metal. The degreasing is conducted at current densities of 3-10 amp./sq. dm. The bath voltage will be 6-8. Degreasing time is usually 1-2 minutes. Combined anodic-cathodic treatments are also used. The object of the final treatment is to oxidize the hydrogen, also to dissolve off thin metal films formed during the cathodic treatment. Copper and copper alloys sometimes discolor during the electrolytic degreasing treatment. To prevent this, sodium or potassium cyanide can be added to the electrolyte.

Testing of Protective Metal Coatings for Porosity

H. Anders: *Beiztechnik*. Vol. 5, No. 1, p. 1.

A useful method of testing the porosity of nickel coatings on iron or steel consists of immersing the nickel-plated parts in a solution containing 200 g./l. copper sulfate. At porous places a red-colored copper coating will be formed. A nickel plate, which can be regarded as satisfactory, should show no red coloration after a dip time of 10 seconds. The potassium ferricyanide test serves for the testing of plated coatings of more noble metals on iron. The composition of the test solution is 1 g. potassium ferricyanide, 10 g. agar-agar, 10 g. sodium chloride, in 1 liter water. The chemicals are dissolved in hot water and, on cooling, the solution sets to a gelatinous mass. Before use, the solution is made fluid by heating. The test part is placed horizontally, the solution poured on, and a bluish color is developed at pores or damages to the deposit. This is termed the Ferroxyl test. The purpose of the agar-agar or gelatine is to localize the blue color, so that the precise position of the pores is located.

For testing cracks and pores in chromium coatings, use is made of a copper solution; the copper precipitated from the copper solution will adhere firmly where the basis metal is exposed, but can be wiped off the chromium. The ammonia test is used for chromium plate on copper or copper alloys; deep blue spots are formed at pores when the tests parts are exposed to ammonia vapor in a glass jar. For testing the porosity of chromium plate on copper or brass, the parts are tested in a solution of 5 g./l. potassium ferrocyanide, 5 g./l. potassium dichromate, 10 g./l. potassium iodide, 1 g./l. mercury sublimate and 150 g./l. hydrochloric acid.

Current Density—Amount of Metal Deposited—Coating Thickness

W. Briese: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 4, p. 152.

The author discusses the various aspects of plating affected by the voltage and current density applied, the amount of metal deposited and the thicknesses of the plated coatings, the treatment given being mathematical and sample calculations being undertaken to show the methods of working out these facts from the figures and data available from the plating bath. The objective is to show the practical man that these methods of precise calculation are greatly superior to hit and miss methods of operation.

LETTER TO THE EDITOR

Dear Mr. Hall:

The acidified copper sulfate test is mentioned in the March Issue "Shop Problems" as a method of determining whether or not the surface of stainless steel is passive.

We recognize this test as a method of determining whether Types 416, 420, 420F, 440A, 440B and 440C of stainless steel fabricated into surgical and dental instruments covered by Federal Specification GG-I-526a have been properly heat treated. These grades in some tempered conditions have a low order of corrosion resistance as indicated by the chart on page 22 of the Armco booklet on "Heat Treating, Forging and Pickling of Stainless Steel." Incidentally, it is doubtful whether Type 420 or 420F will meet the test requirements when hardened to Rockwell C40-45 (see chart 6, p. 18 of booklet).

In fabricating some surgical instruments, such as scissors, the cutting edges are hardened but the handles are left in the annealed or tempered condition to facilitate adjustment of the cutting edges. The blades will meet the copper sulfate test requirement but the handles will not. However, the surfaces of both areas have a passive film or they would rust like ordinary iron when exposed to the atmosphere.

Properly cleaned surfaces of stainless steel readily acquire a passive film upon exposure to air. The passive surface is sometimes reinforced by the action of nitric acid. However, the nitric acid treatment is more useful in removing particles of iron imbedded in the surface during fabrication. Tests to determine whether metallic iron or iron oxide remain on the surface are described in the Tentative Recommended Practice for "Descaling and Cleaning Stainless Steel Surfaces" (ASTM No. A380-54T). The "tell-tale" rust test is simplest.

This recommended practice took into consideration Mr. F. L. LaQue's "Report on Passivation of Corrosion-Resistant Steels" (ASTM Proceedings, Vol. 46, p. 175, 1946). One part of this report stated, "It was pointed out that a properly cleaned corrosion-resistant steel surface rapidly would become passive in air and in many other environments and passivation is not necessary to make these alloys corrosion-resistant."

Several methods of measuring the degree of passivity have been proposed but none has had universal acceptance. One method involves measuring a "break through" potential. It is described by Mahla and Nielsen in "Passivation of Stainless Steel" (Transactions of The Electrochemical Society Vol. 89 (1946) p. 167.

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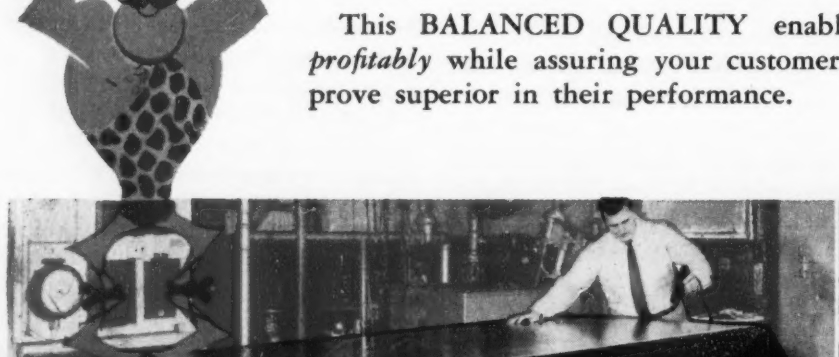
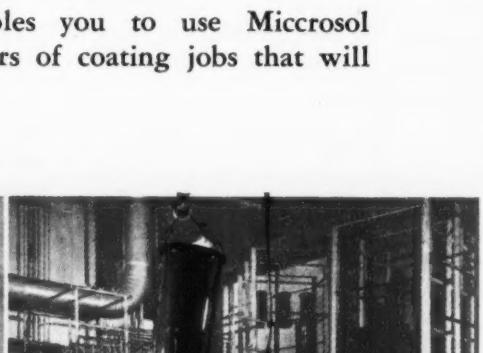


Spark testing a large plating tank coated with Miccrosol Spray S-2003.



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Nickel Stripper

United Chemical Corp., Dept. MF, 45 Seekonk St., Providence 6, R. I.

A new nickel stripper (patent pending) called Ni-Plex contains no cyanide, caustic, or acid, does not fume, and is stable over long periods of time at elevated temperatures.

The product strips nickel economically and rapidly from all basis metals such as steel, copper, brass. It is the only effective and safe nickel stripper for all types of die castings and for parts containing two or more different base metals. It does not pit or corrode the basis metal, it is claimed.

The product is marketed in two solutions, as Ni-Plex A and Ni-Plex B, which are easily mixed and diluted to proper strength. The bath is operated at from room temperature to 80°C. at a pH of from 7 to 11. One gallon will strip 43 ¼ square feet of 0.0001 nickel plate. The stripping rate at room temperature is 0.00025 inches per hour; at 80°C. the rate is 0.0015 inches per hour.

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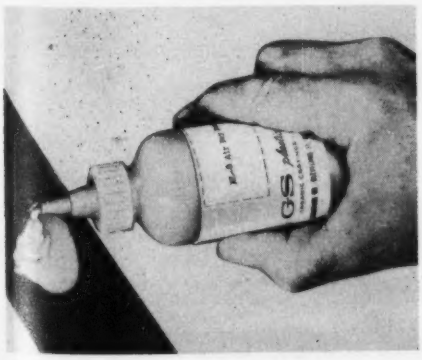
Air-Drying Rack and Maintainance Coating

The G. S. Plastics Co., Dept. MF, 15583 Brookpark Rd., Cleveland, Ohio.

Platers and manufacturers are invited to sample, without cost, the advantages of new, improved XL-8 air-dry rack and maintenance coating. A free trial "Squeezon" applicator is included with the purchase of the first gallon. The applicator is designed for quick, easy patching or touch-up, and will enable tht user to test-prove the coating within a 30-day period without charge or obligation. The unopened gallon is returnable during the same period for full refund or credit.



The coating is applied by dip, spray, or brush over any air-dry or baked-on coatings, or uncoated surfaces. No ovens or special equipment required. It replaces common 'putty-patching", and dries rapidly to an extremely tough, elastic cover, resistant to abrasion, cuts, and wear. A tight bond is formed on ferrous and non-ferrous metals, protecting dipped racks with a uniformly thick coating on all surfaces, from heavy splines to thin wire contacts. Coating thickness builds up rapidly: 1 coat 4 to 6 mils, 2 coats 12 to 15 mils, 3 coats 22 to 26 mils, 4 coats 34 to 40 mils. Exceptional protective characteristics as a general maintenance coating provide effective barrier against corrosion for ducts, outsides of tanks, spillage areas, tote boxes, funnels, and handling components—hooks, overhead conveyor carrier bars, baskets, etc.

The product is supplied in metal containers—quarts, gallons, and 55-gallon drums.

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Alkaline Deruster

Wyandotte Chemicals Corp., J. B. Ford Division, Dept. MF, Wyandotte, Mich.

Ferlon, a new alkaline derusting compound, often eliminates the need of an acid dip and a rinse prior to electroplating and shortens some plating cycles up to 30%, according to the above manufacturer. It is readily soluble in water; strong solutions with high boiling points can be prepared.

Applications of the material are:

1. To remove rust and light scale
2. To remove carbon and oxides from stainless steel
3. As an alkaline paint remover

4. As an aid to smut removal and for difficult steel electrocleaning jobs
5. For barrel finishing
6. To remove stains from steel, bronze and copper alloys
7. To replace acid in electroplating operations.

Packed in both the 150-lb. and 400-lb. drums is a plastic bottle of detergent and rinse promoter. When current is used, this additive provides a foam blanket to prevent fumes. When no current is used, assistance is given in both detergency and rinsing.

54/Circle on Readers' Service Card

Zinc Brightener

Wagner Bros., Inc., Dept. MF, 480 Midland Ave., Detroit 3, Mich.

A newly developed zinc additive for plating operations which produces bright, fine-grained deposits comes in the form of a light tan powder. Dissolved in water prior to use, the additive actually is a dual-purpose brightening agent that can be used for barrel and rack plating operations.

In certain applications, the zinc addition agent, Iso-Brite ZB 567, can be employed with a liquid brightener, particularly in barrel plating stampings. However, the company says, the new development can be used alone to produce a bright plate with good luster.

According to company engineers, and original charge of one pound of the new zinc additive per 100 gallons of purified zinc solution will give excellent results and, under normal operating conditions, about 2 to 4 ounces

of the agent per 100 gallons per day will maintain the brightness.

The brightener, the company advises, will not produce bright deposits from a solution out of chemical balance, or contaminated with impurities, either metallic or organic. Thus, if two normal additions do not provide good brightness out of the plating bath or, if the brightness range lacks normal staying power, chances are that the cause is elsewhere.

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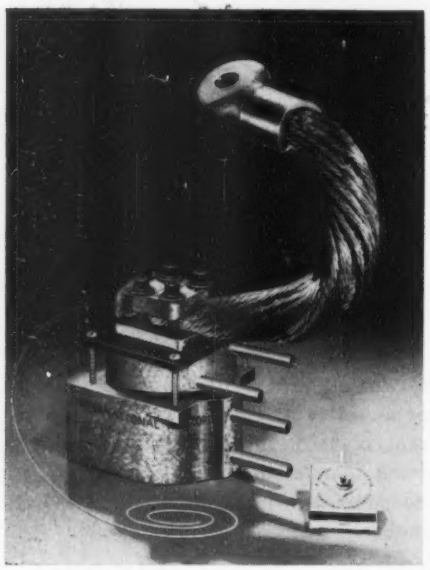
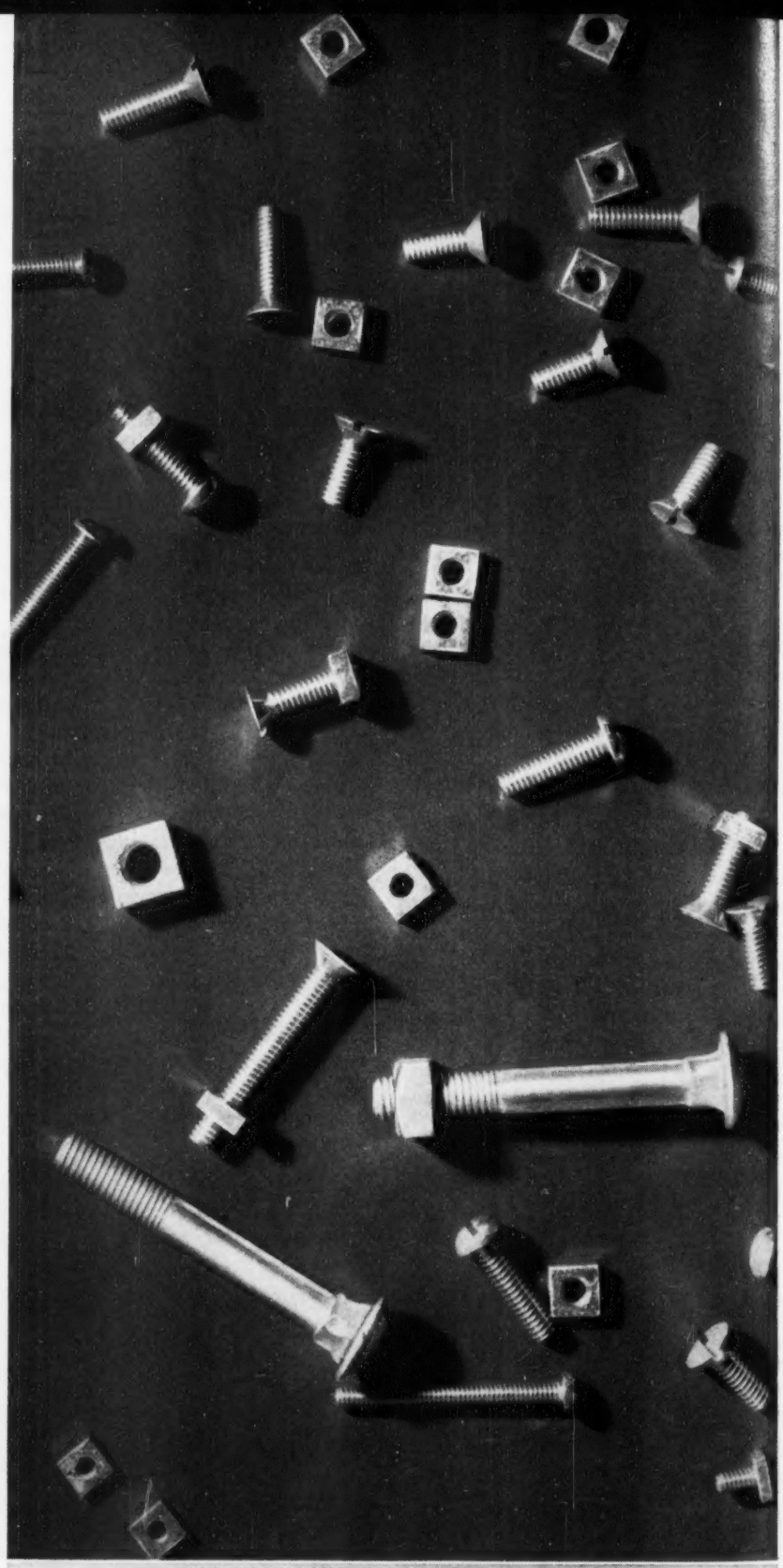
Germanium Power Junctions

International Rectifier Corp., Dept. MF, 233 Kansas St., El Segundo, Calif.



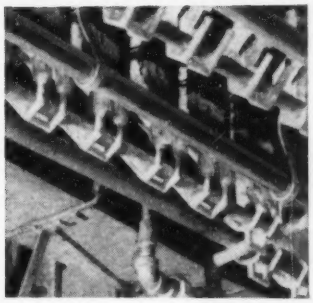
New highly efficient, liquid-cooled germanium power junctions rated at 670-amps. rectified d. c., are specifically engineered for heavy power conversion. Six junction types are available in the range of 20 to 66 volts rms. Conservatively rated at 670 amps. maximum full load output current, measured as rectified d. c. amps per junction in three-phase operation, these low-density, low-voltage junctions provide 98.5% efficiency, and will appreciably lower the power consumption of rectifier equipment. A four-to-one savings in weight, and a more than sixteen-to-one reduction in cubic space requirements in equipment can result from the application of these compact junctions. Connected in a three-phase bridge circuit, six of these junctions will deliver 170 kw (2,000 amps at 85 volts.)

The junction measures: 5" x 3 7/8" x 3 3/8"; features a copper housing cast around special alloy steel tubing for maximum cooling. Re-circulation of the



Federated products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust



Brighter Plating at lower cost!

Competitive testing at ASARCO's Central Research Laboratory has proved that Federated Plating Brighteners will do a better job at lower cost.

CADMAX for cyanide cadmium plating, is compatible with all organic brighteners, comes with an adjuster solution to give you brilliant results, even from a new bath. No break-in is required.

ZIMAX in powder or liquid form, is most economical to use. It is applicable to every type of zinc plating operation, and is compatible with most other zinc brighteners.

NIMAX is a highly concentrated nickel brightener for use in barrel nickel plating. Five cents worth is enough for approximately 50 pounds of work. The deposit is ductile and extremely corrosion-resistant.

Send us a sample of your plating bath. Then follow the simple instructions that we give you. You'll get better results, at lower cost!

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

57/Circle on Readers' Service Card

cooling medium over an internal cooling area of 52 sq. in. in a volume of 48 cu. in. provides a highly efficient heat exchanger, which makes it especially suited to the handling of heavy, continuous industrial loads. Water, oil, or other accepted coolants may be used.

58/Circle on Readers' Service Card

Chromium Stripper

MacDermid Inc., Dept. MF, Waterbury, Conn.

Developed originally to replace liquid acids in neutralizing and activating acid dips in plating operations, M-629, a dry acid replacement salt, is finding an increasing favor as an efficient, easy-to-handle chrome stripper. An automotive parts manufacturer is currently stripping 0.00002" of chrome plate in approximately ½ minute by immersion only.

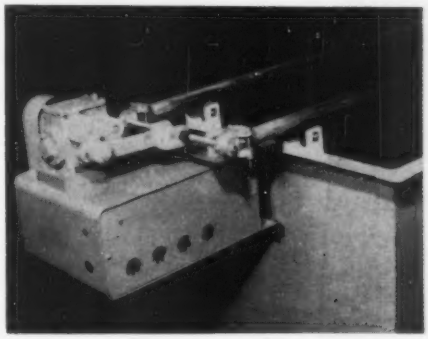
The material is used in a solution of 1 lb./gal. heated to 180 - 190°F. After stripping, the nickel underplate is bright, lustrous and free of smut and oxide discoloration. Rinsed carefully, and then replated, the parts are claimed to show no whiteness or streaks. No objectional fumes are present.

In conventional operations in the plating cycle, users are said to report better activation and plate adhesion, brighter plate and freedom from smut and mottled effects.

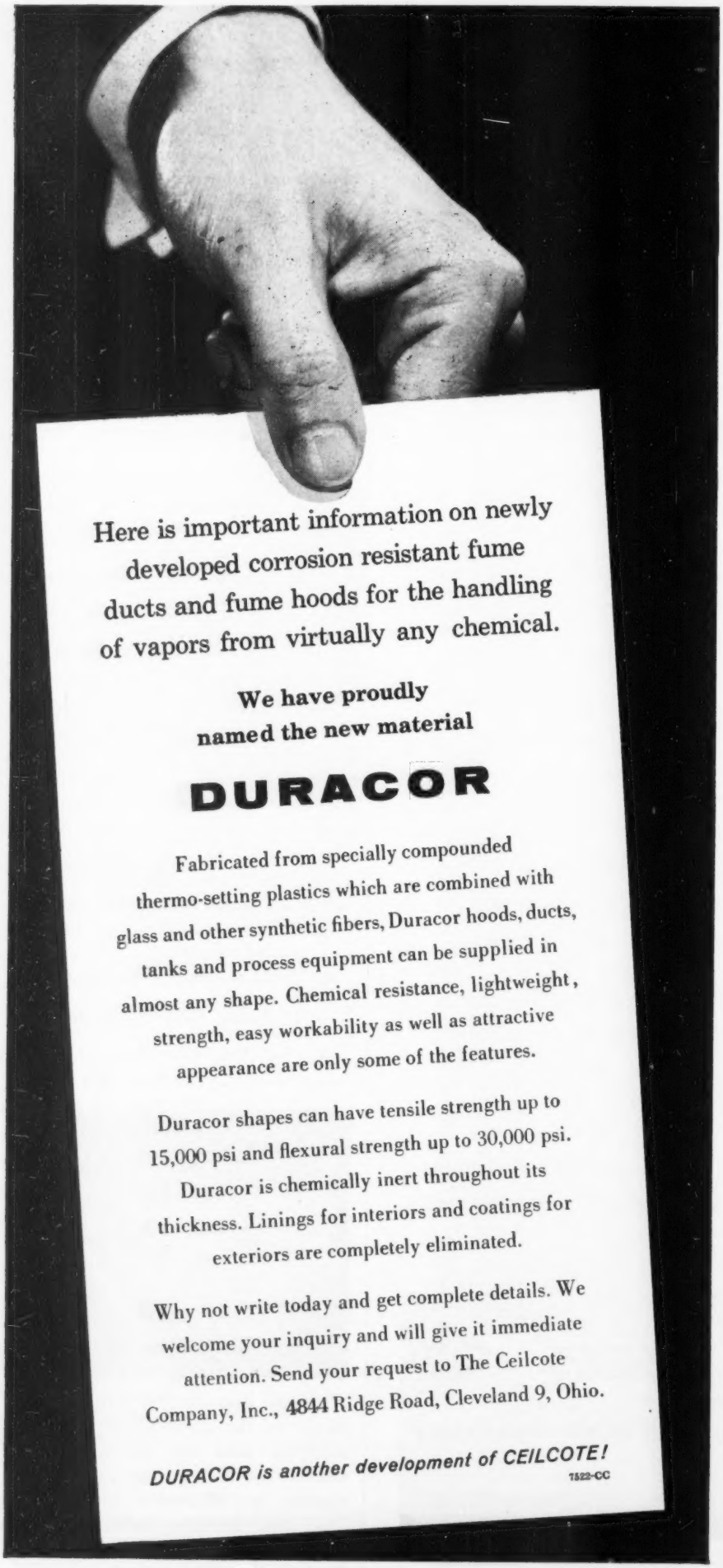
59/Circle on Readers' Service Card

Cathode Rod Agitators

Randall Mfg. Co., Dept. MF, 1373 Lafayette Ave., New York, 59, N. Y.



Ramco cathode rod agitators just clamp on the electroplating tank, eliminating need for stands, brackets, switches or wiring. The cathode connectors are adjustable from ½" to 1½" rod. Leveling bolts permit accurate alignment on installation and the Bakelite rollers mounted with fric-


Here is important information on newly developed corrosion resistant fume ducts and fume hoods for the handling of vapors from virtually any chemical.
We have proudly named the new material
DURACOR
Fabricated from specially compounded thermo-setting plastics which are combined with glass and other synthetic fibers, Duracor hoods, ducts, tanks and process equipment can be supplied in almost any shape. Chemical resistance, lightweight, strength, easy workability as well as attractive appearance are only some of the features.
Duracor shapes can have tensile strength up to 15,000 psi and flexural strength up to 30,000 psi. Duracor is chemically inert throughout its thickness. Linings for interiors and coatings for exteriors are completely eliminated.
Why not write today and get complete details. We welcome your inquiry and will give it immediate attention. Send your request to The Ceilcote Company, Inc., 4844 Ridge Road, Cleveland 9, Ohio.
DURACOR is another development of CEILCOTE!
7522-CC

60/Circle on Readers' Service Card

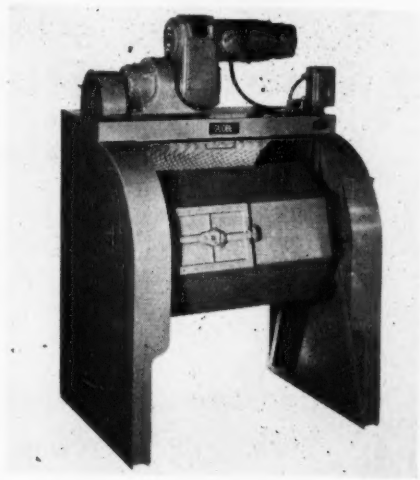
tionless needle bearings. A single bo attaches roller housing. No insulatio is necessary. The motor is enclose and fully protected against splashin and fumes. All castings are nicke plated to prevent rusting and corrosion

Models are available in both singl rod, with two rollers, and double rod with four rollers.

61/Circle on Readers' Service Card

Barrel Finishing Equipment

Casalbi Company, Dept. MF, 540 Wayne St., Jackson, Mich.



The Globe 3000 Series Burr-Rite, Sr. represents the latest in barrel finishing equipment. It is designed for small to medium large production runs. For production involving the finishing of metal, plastic or rubber parts, it assures time and money savings. It will handle medium quantity runs that would otherwise tie-up larger equipment. It affords the advantage of doing up to four operations at one time, or process up to four large precision parts at one time in individual compartments for such operations as deburring, grinding, polishing, burnishing and deflashing.

Cost saving features of the machine include:

Free-swinging safety screen with no troublesome channel which might be damaged.

Lightweight aluminum door with quick-acting latch to allow faster loading, unloading.

¼-inch abrasive-resistant bonded neoprene lining.

Manually operated forward and reverse drum switch for easy operation.

Extra-strength A-frame design.

Modern design waterfall front

with heavy gauge steel cabinet paneling.

Manual starter providing motor overload protection.

Heavy - duty chain - to - sprocket drive.

62/Circle on Readers' Service Card

Powdered Chromate Coating

Conversion Chemical Corp., Dept. MF, Rockville, Conn.

A new powdered chromate coating for producing iridescent films on zinc, cadmium, copper, brass and zinc die castings, may be adjusted to give varying iridescent bronze shades through varying the pH, concentration, and the time of immersion. Corrosion protection is ample to meet all Government specifications; and the bath can be operated through controlled temperature to produce films which are hard when wet, and which will not bruise in bulk handling.

Kenvert No. 18, is of particular interest to manufacturers, as cost savings of approximately 50% may be enjoyed over commonly used formulae which the customer would make himself, it is claimed.

The product maintains readily on long usage and gives very bright undertones on both zinc and cadmium plated work.

63/Circle on Readers' Service Card

Low Cost Degreaser

Tect, Inc., Dept MF, Cortland Ave. and Erie St., Dumont, N. J.

Model #10 solvent vapor degreaser, is constructed of 14 guage steel with a heavy zinc coating and is heated with

Now... for only $295.00

...you can get a 500 G.P.H. plating solution filter...

A new simplified construction principle makes this low price possible.

The Sparkler Plater's-Pal will handle all acid and cyanide solutions (except chromic acid and high chloride nickel).

The Sparkler PLATER'S-PAL will filter

Arsenic Cyanide
Brass Cyanide
Bronze Cyanide
Cadmium Cyanide
Copper Cyanide
Neutralizers (Cyanide & Borax)
Tin Stannite
White Brass Alloy
Zinc Cyanide
Acid Copper Sulphate
Acid Zinc
Black Nickel Acid
Cadmium Fluoborate
Copper Fluoborate
Lead Sodium Fluoborate
Lead Sulfamate
Nickel
Palladium
Tin Fluoborate
Tin Nickel Alloys

Sparkler plating filters are used in some of the largest plating plants in the world.

SPARKLER PLATER'S-PAL FILTER

★ Only clean solution flows through the pump—no excessive pump wear.

★ Visual inspection of all parts including filter plates possible without dismantling filter.

★ All solution reclaimed.

★ Completely enclosed but with easy access to operating parts.

★ Cover locks and unlocks with one quick opening connection—no cover bolts, no complicated sealing devices.

★ Can be cleaned and back in operation in 10 minutes.

★ Positive uniform quality of filtration at all times.

Sold only through plating suppliers

SPARKLER FILTERS

Sparkler Manufacturing Co.
Mundelein, Illinois

Sparkler International Ltd., with plants in Canada, Holland, Italy & Australia.

Filtration engineering and manufacturing exclusively for over 25 years.

64/Circle on Readers' Service Card

Every batch checked. Every can filled with a full weight of extra high quality 99.75+% Chromic Acid. Prompt delivery from ample factory and nearby distributor stocks. Why not order BFC Chromic Acid next time?

BETTER FINISHES & COATINGS, INC.

268 Doremus Avenue,
Newark 5, New Jersey

2014 East 15th Street,
Los Angeles 21, California

65/Circle on Readers' Service Card

a Chromalox 1250 watt element which may be connected to an ordinary 115 volt outlet.

A stainless steel coil maintains the vapors of the chlorinated solvent at the proper level. A work rest and a light-weight, galvanized steel basket are also provided—an "on-off" switch and a thermometer. The bottom is insulated with asbestos and fibreglass.

The unit includes inlet and outlet hoses for quick connection of the condenser to tap water supply. It will clean a minimum of 100 lbs. of steel per hour in the clean vapors of non-flammable Vythene, perchlorethylene, or trichlorethylene. Only 1 ½ gallons of solvent are required for operation. The inside diameter is 14 ½ inches and the vapor cleaning height 10 ½ inches.

Priced at only $98.50, f. o. b. Dumont, N. J., the Model #10 is the smallest of several solvent vapor degreasers manufactured by the company. It is available on a trial basis from jobbers at various points throughout the United States.

66/Circle on Readers' Service Card

Nickel Stress Controller

Seymour Mfg. Co., Dept. MF, 4 Franklin St., Seymour, Conn.

A new chemical for closely controlling the physical properties of electrodeposited nickel has been developed especially for electroplaters engaged in precision nickel plating.

Intended primarily for use in the plating of printed circuits, the special chemical, marketed under the trade name PCN, is added to a Watt's solution plating bath. The addition is said to produce hard, ductile and low-stressed nickel deposits with an extremely active surface highly receptive to subsequent plating with rhodium, chromium, or gold.

According to the manufacturer, stress in the nickel deposits can be closely controlled in a range from neutral or zero to a compressive stress of 8,000 psi.

67/Circle on Readers' Service Card

Barrel Finishing Compound

Esbec Barrel Finishing Corp., Dept. MF, 18 Beech St., Byram Conn.

No. 234 is a neutral, powdered, non-abrasive compound whose outstanding property is claimed to be its ability to replace acid compounds and so eliminate the necessity for a subsequent neutralizing operation, combined with unusual burnishing ability. Other features are:

a) Removes rust, oxide stains, and light heat treat scale.

b) Removes the gray film left after long runs in aluminum oxide chips in preparation for burnishing.

c) Produces amazing fast burnishing results (15 to 45 minutes) with small chips or steel burnishing media.

d) Reconditions steel burnishing media, removing films which prevent good results and restoring luster, usually in a 50 minute run.

With all these advantages, the compound is extremely economical to use, as only 2 to 3 ounces are required per gallon of water.

68/Circle on Readers' Service Card

Concrete Floor Surfacing and Patching Material

Dittbrenner Associates, Inc., Dept. MF, Rockaway, N. J.

Poly-Chem 1100 is a modified epoxy formulation made to obtain a number of desirable characteristics.

The special feature of the material lies in its being able to relieve inner

stresses, thus maintaining complete bond under traffic loads and under temperature changes. It is hard and tough, able to withstand heavy traffic and use. It is dust-free, and can be feather edged, it is claimed.

The product is resistant to non-oxidizing acids and solutions, to most solvents and to high strengths of caustics. It can be used for waste acid immersion service, as in trenches and sumps. It bonds to clean steel, aluminum, wood and most other surfaces without priming, and can be used as a surfacing material, a patching material, as a grout, and without aggregate, as a high film build, non-sagging, corrosion resisting paint that is usually impermeable in a one-coat application.

69/Circle on Readers' Service Card

Acid Pickling Inhibitor

Armour and Co., Chemical Div., Dept. MF, 1355 W. 31st St., Chicago 9, Ill.

A new pickling inhibitor for use in sulfuric, sulfamic and phosphoric acids is an aliphatic derivative. Called Inhibitor 2508, it can be used where acids are employed to chemically remove undesirable coatings from metal surfaces. The product is in liquid form, readily dispersible in water and highly effective in low concentrations. It can be used at rates as low as 100 to 500 ppm.

Laboratory tests indicate that mild steel in 15% sulfuric acid at 200°F has a corrosion rate over 2.5 pounds per square foot per day, compared to less than 0.03 pound per square foot per day in an inhibited acid.

70/Circle on Readers' Service Card

Dust and Fume Collector

Schmieg Industries, Inc., Dept MF, 23930 Sherwood, Centerline, Mich.

The Vertical Rotor dust and fume eliminator has been introduced to meet the need for a relatively low-priced, yet high efficiency wet method collector. Test results compare favorably with any of those published by similar method units. Contaminated air enters this collector at high velocities. A cyclonic action is set up in the outer chamber causing the larger particles to drop into the surface of the integral tank. The air stream next passes through a vertical water curtain to eliminate heavier particles, then through a high velocity horizontal water curtain to remove finer particles and remaining contaminants. A series of baffles removes excess moisture before purified air is either vented to the atmosphere, or where desired, returned to working area. The unit is easily maintained, can be constructed of corrosion resistant alloys or lined where necessary, and features low overall height to fit into trusses.

72/Circle on Readers' Service Card

Bondable Teflon

Abbott & Biddle, Dept. MF, 2417-X56 Federal St., Philadelphia 1, Penna.

A new surface treatment for Teflon sheets and tapes alters the surface to make possible permanent bonding to a variety of materials with conventional commercial adhesives. Good bond strengths have been obtained between aluminum, mild steel, wood, plastic, and other rigid materials.

It should prove most valuable for lining or covering chutes, rolls, tanks, pipes, ducts; facings for valves, machined parts, and many other similar applications.

73/Circle on Readers' Service Card

Conveyor Turntable

The Alvey-Ferguson Co., Dept. MF, 1566 Disney St., Cincinnati 9, Ohio.

A new conveyor turntable transports cartons, cases and packages through a 180° turn in 25% less space than required by conventional powered con-

Denver Post finds "Plus-4" Anodes do a better job of plating roto cylinders

The *Denver Post* is one of the few newspapers with its own rotogravure plant. Here it prints its *Empire* magazine and its comic section—also magazine sections for the *Seattle Times* and *Portland Oregonian*. It is noted throughout the Rocky Mountain area and the Northwest for its high-quality color printing.

Two years ago, the *Denver Post* switched to "Plus-4" Anodes in electroplating the printing surfaces of the rotogravure cylinders. The first result noticed was a big reduction in sludge and loss of copper in the solution.

The cylinders come out of the plating tank so uniform that it takes very little time to polish them. The finishers report the copper is good for tooling.

The copper printing surface is superior as far as uniformity and density are concerned. The cylinders hold up for the entire run—400,000 copies in the *Empire* run—and retain full quality in the light tones.

SEE FOR YOURSELF. A trial will show you how Anaconda "Plus-4" (Phosphorized Copper) Anodes can save you time and money—give you better work. Send the coupon today. 57142

ANACONDA®
"Plus-4" Anodes
(Phosphorized Copper)

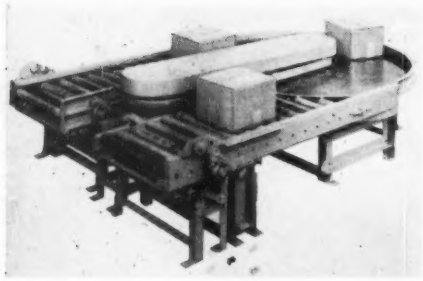
Made by
The American Brass Company

The American Brass Co., Waterbury 20, Conn.
In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Give me details on how I can get a test quantity of "Plus-4" Anodes sufficient to supply one tank.

NAME.....
COMPANY.....
ADDRESS.....
CITY.....ZONE.....STATE.....

71/Circle on Readers' Service Card



veyor curves. It is particularly adapted for installations in narrow areas or where space is at a premium.

Designed for use in either live roller or powered belt conveying systems, this new A-F 180° turntable features an endless traveling inner guide belt which ensures correct tracking of cartons or cases throughout the turn, and proper discharge onto the receiving conveyor line. A beveled edge on the turntable facilitates transfer from the conveyor line onto the rotating turntable.

The turntable is driven by means of a system of spur gears by a variable speed motor, which can be regulated to the speed of the incoming and receiving conveyor lines. This motor also powers the traveling inner guide belt. Proper tension of the belt is maintained by an automatic take-up.

All moving parts of this new Turntable are covered with guards to protect against accidental injury.

74/Circle on Readers' Service Card

Atomizing Nozzles

Spraying Systems Co., Dept. MF, Randolph St., Bellwood, Ill.

An interesting new group of Full Cone spray nozzles provide extremely small capacities and atomization using hydraulic pressure only. Twelve different nozzles are offered, in both male and female pipe connections, in capacities ranging from 0.042 gpm to 1.400 gpm at 20 psi. Each nozzle is supplied complete with strainer. The full cone spray pattern of the nozzle is uniform in distribution and the spray angle ranges from 50° to 67° as capacity increases.

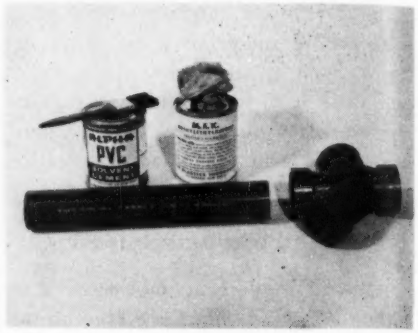
75/Circle on Readers' Service Card

PVC Drainage Systems

Alpha Plastics Inc., Dept. MF, Livingston, N. J.

The above manufacturer announces the availability of polyvinyl chloride pipe and drainage fittings for complete drainage systems to handle corrosive liquid wastes.

The pipe and fittings have smooth internal walls and are designed to eliminate crevice corrosion and provide optimum flow. The pipe, Schedule 40 IPS, is available in standard lengths of 10′ and 20′ and in nominal sizes of 1 ½″ to 4″. The molded socket-type fittings come in all needed styles: 90° short Y branch tee, 45° Y branch,



T-Y cross, coupling, 90° short branch cross, and socket to socket and threaded to socket increaser bushings. Socket-type fittings are pitched ¼" per foot to facilitate assembly.

COPPERHEAD!
See these Copperheads, Harry? We're still not getting anywhere with our cleaning problem. I think I'll try Dick Relick at Pennsalt . . . he helped us straighten out our phosphate coating trouble last month, and he ought to have an answer for this.
Yes, in fact we've batted this all around our department. It's possible you're using too strong a cleaner for this job.
Too strong? Now there's a switch!
Cleaning before porcelain enameling isn't a cut-and-dried proposition. We think you need a mild, wetting-type cleaner built to penetrate this complex soil. We suggest you try a drum of Pennsalt 85.

BUSINESS ITEMS

Sel-Rex Promotes Mitwol to Manager of Detroit Office

The promotion of *Sid Mitwol* to manager of their Detroit office has been announced by *Sel-Rex Corporation*, Nutley, N. J., manufacturers of metal finishing equipment and supplies.

Having joined the firm in 1948 as a sales engineer, Mitwol has progressed through positions of increasing executive responsibility, and was product sales manager for the firm's Rectifier Division prior to his current assignment. His new headquarters will be the Detroit office located at 18040 James Couzens Highway, where he will be responsible for his company's entire midwestern operations, including servicing distributors and representatives in the area.

A graduate electrical engineer of C. C. N.Y's School of Technology, Mitwol was formerly associated with Federal Telephone and Radio Co. and Radio Receptor Co., Inc. In his new position, he replaces *S. S. Wilson* as vice president and general sales manager.

Sid Mitwol

Solvay Appoints Dr. Copson

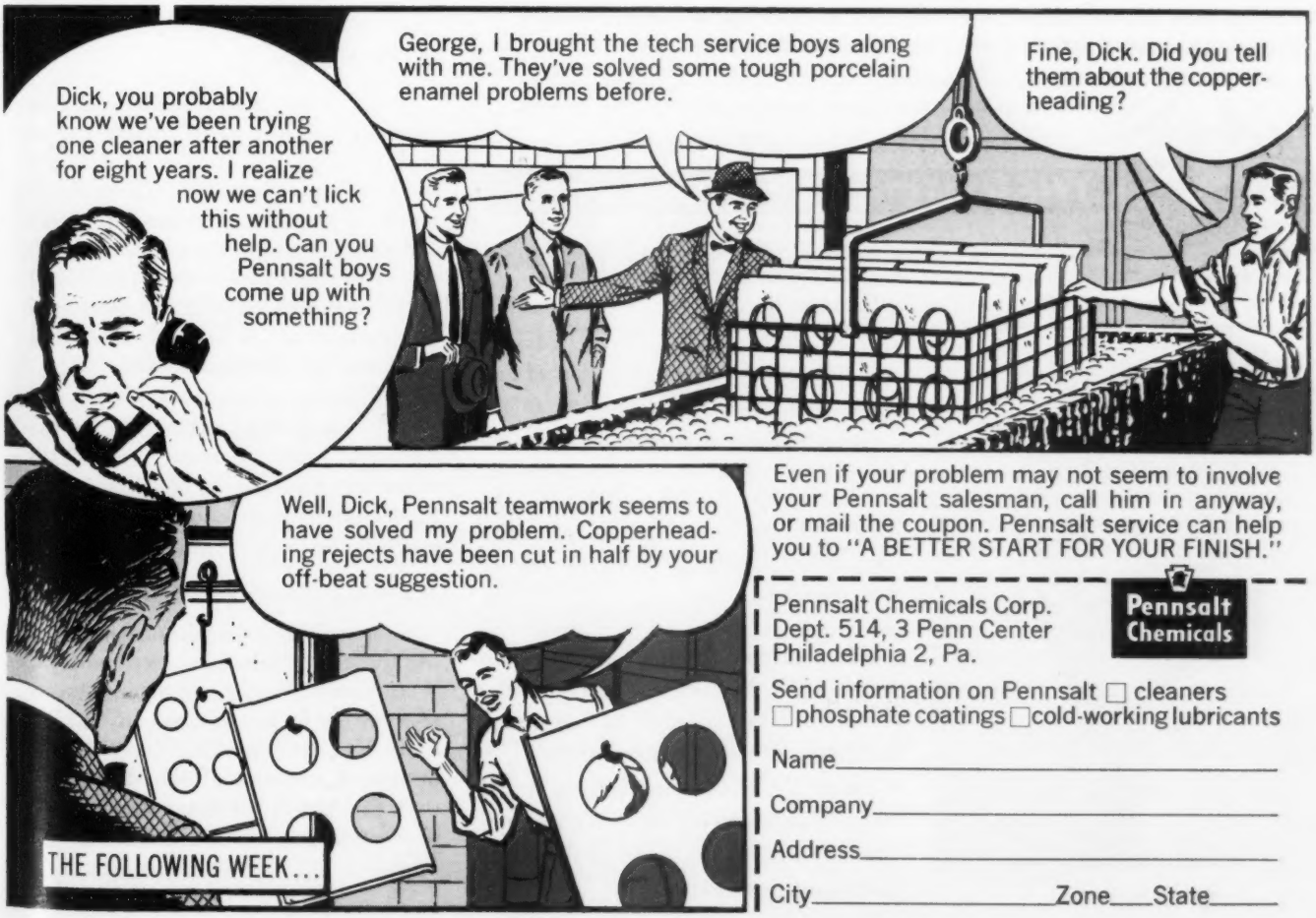
Appointment of *Dr. Raymond L. Copson* to post of assistant to the director of development, Solvay Process Division has been announced by *Allied Chemical & Dye Corp.* Dr Copson has been in charge of research and development for Mutual Chemical at the latter's Baltimore laboratory. Mutual has been affiliated with Solvay since January 1, 1957. In his new assignment Dr. Copson will continue to direct the research and development activities carried on in connection with Mutual's chromium chemicals.

A native of Massachusetts, Dr. Copson holds B. S. and M. S. degrees from Worcestor Polytechnic Institute and obtained his doctorate in Chemical Engineering at Yale University. He has been with Mutual Chemical since July, 1949.

Dr. Copson will make his headquarters at Solvay's research and engineering center in Syracuse.

Tranter Mfg. Appoints Saxton

Appointment of *Robert W. Saxton* as assistant general sales manager has been announced by Tranter Manufacturing, Inc. In his new capacity, he will be responsible for direction and co-ordination of all inside sales activi-


Dick, you probably know we've been trying one cleaner after another for eight years. I realize now we can't lick this without help. Can you Pennsalt boys come up with something?
George, I brought the tech service boys along with me. They've solved some tough porcelain enamel problems before.
Fine, Dick. Did you tell them about the copper-heading?
Well, Dick, Pennsalt teamwork seems to have solved my problem. Copperheading rejects have been cut in half by your off-beat suggestion.
THE FOLLOWING WEEK...

Even if your problem may not seem to involve your Pennsalt salesman, call him in anyway, or mail the coupon. Pennsalt service can help you to "A BETTER START FOR YOUR FINISH."

Pennsalt Chemicals Corp.
Dept. 514, 3 Penn Center
Philadelphia 2, Pa.

Pennsalt Chemicals

Send information on Pennsalt ☐ cleaners ☐ phosphate coatings ☐ cold-working lubricants

Name_____

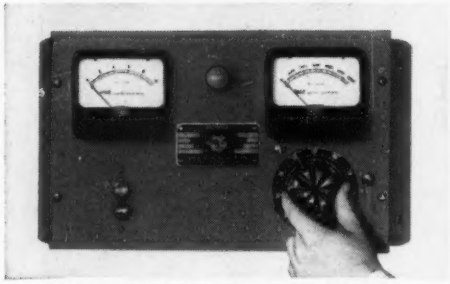
Company_____

Address_____

City_____ Zone___ State____

NOW BALANCED SINGLE KNOB STEPLESS CONTROLLED PLATING RECTIFIERS

GERMANIUM
SELENIUM
SILICON
RECTIFIERS
WITH



"Finger-Tip" Control Panel 10" x 18" x 6"

REACTRON MODIMATIC CONTROLS

- STABILIZED OUTPUT VOLTAGE
- SMALL OPERATOR'S PANEL MOUNTS ANYWHERE
- NO FLOOR SPACE
- SMALL INTERCONNECTING WIRES
- "FINGER-TIP" CONTROL
- NO MOVING PARTS
- LOW MAINTENANCE

Controls all phases simultaneously— Avoids possibility of damaging germanium junctions.

The Ther REACTRON MODIMATIC CONTROL gives you instantaneous, perfect, *stepless* control of plating voltage. Stabilized output produces better plating. Single control knob controls all phases simultaneously...No possibility of damaging germanium junctions by improper setting of 22 or 44 position tap switches.

The miniature operator's control panel furnished with all MODIMATIC CONTROLLED rectifiers gives you "finger-tip" control where you want it. Can be mounted right at the plating tank — Requires no floor space — Measures only 10" x 18" x 6" — needs only #14 wires to control panel.

WRITE TODAY for technical study showing the advantages of Reactron VS. tap switch or motor driven variable auto-transformer controls.

It's THER...Whatever your D-C Requirement

THER ELECTRIC & MACHINE WORKS
ESTABLISHED 1915
19 SOUTH JEFFERSON ST. • CHICAGO 6, ILLINOIS

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Robert W. Saxton

ty, and to assist in the direction of outside sales activity. In addition to the supervisory responsibility for all administrative aspects of the sales department, Mr. Saxton will assume the responsibility for liaison between sales and other operating departments of the company.

Mr. Saxton joined the firm in January, 1953, as sales manager for the Contract Division, after having served as district sales supervisor for the U. S. Gypsum Co. of Chicago. During World War II he was with the Navy as navigator of a destroyer tender in the Mediterranean Sea operations.

Yeiser Joins Sparkler Mfg.

Frank M. Yeiser

Sparkler Mfg. Co. announces that *Frank M. Yeiser* has joined their organization in the capicity of director of filtration, Technical Division.

Mr. Yeiser brings with him a wealth of filtration experience in the chemical, metallurgical, petroleum and food processing industries. Many friends in these industries will remember him as a pioneer in new filtration processes and equipment developments.

Dow Establishes Sales Office in Pittsburgh

Dow Chemical Co. opened a new sales office July 1 at 1 Gateway Center in Pittsburgh, Pa. Named as manager of the office is *Donald H. Gilmore*, formerly supervisor of magnesium sales for the company's Cleveland sales office. The office, seventeenth established by the company in principal cities, will service portions of Pennsylvania, West Virginia, Maryland and Ohio.

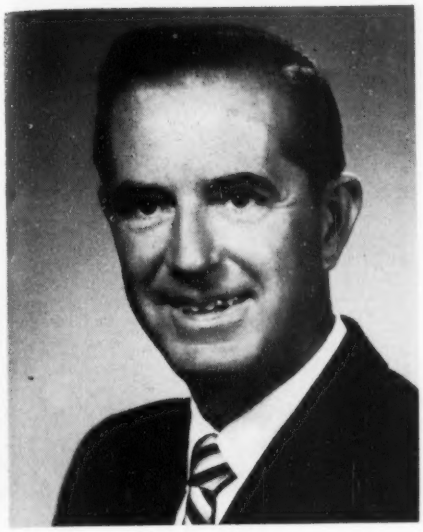
Gilmore joined the firm in 1946 and was a magnesium salesman in the Cleveland office territory until 1948 when he assumed responsibilities as supervisor of magnesium sales in that territory.

Wirshing Transferred By A.C.P.

Charles R. Wirshing has been named metalworking chemicals sales manager, West Coast District, according to an announcement by *American Chemical Paint Co.*, Ambler, Pa. Mr. Wirshing became a member of the ACP sales staff, in Detroit, ten years ago and was transferred to Niles, California, in 1952.

He resides at Los Altos, California.

Lord Chemical Appoints Kearns



John G. Kearns

John G. Kearns has been appointed production manager of *Lord Chemical Corp.*, York, Pa., manufacturer of equipment and compounds for precision barrel finishing of metals and plastics. In his new position he will be responsible for ordering and expediting materials to meet sales forecasts, customer orders and shop requirements.

Kearns was formerly with York-Shipley, Inc., of the same city as vice president and manager of residential heating and cooling equipment sales and, previously, as vice president and general manager of the ordnance division of that firm.

New Appointments at Hooker

John N. Moore, Charles A Strack, Henry R. Morrison, and *Matthew S. Bissell* have received new sales department appointments, it is announced by Hooker Electrochemical Co., Niagara Falls, N. Y.

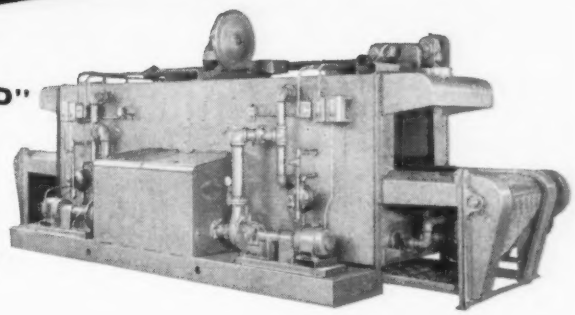
Mr. Moore, formerly product supervisor—Virgo Salt and Fluorolube, is now supervisor—jobber sales. His former position is filled by Mr. Strack who has been in Virgo technical service.

Mr. Morrison, recently released from army training, has been transferred to Los Angles, Calif., as trichlorethylene specialist. He first came to the company in 1952 as a chemical engineer in the process study group, following graduation from Pennsylvania State University with the degree of bachelor of science in chemical engineering. In 1953 he was transferred to the sales department as sales production coordinator.

Mr. Bissell, a 1950 graduate of New York University, is newly employed as a sales representative in the Chicago district. He had been in pharmaceutical sales since 1951, with G. D. Searle & Co., Chicago, Ill.

Why buy BLAKESLEE METAL PARTS WASHING and SURFACE TREATMENT MACHINES

"CONVEYORIZED"
"AUTOMATIC"
"MECHANIZED"
"AUTOMATION"



Many new words and phrases have been coined to describe modern production methods, one word in particular fits *BLAKESLEE*—

"FORESIGHT"

Over 40 years ago, before World War I, BLAKESLEE built a completely automatic power washer.

Because of this "foresighted design" many BLAKESLEE washers that were built over 30 years ago are still fulfilling time and motion requirements and modern automation needs. These machines are also mute testimony to BLAKESLEE quality and rugged construction which remains a basic requisite of all BLAKESLEE products.

Blakeslee Field Engineers are ready to help you with your metal cleaning problems. Why not call upon them!

G. S. BLAKESLEE & CO. 1844 So. Laramie Ave., Chicago 50, Ill. NEW YORK • LOS ANGELES • TORONTO

also Manufacturers of Blakeslee Degreasing Machines and Blacosolv Degreasing Solvent

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Tuel Joins Wyandotte Chemicals

David H. Tuel is *Wyandotte Chemical Corp.'s* new industrial representative in the Pacific Northwest. He will headquarter in the firm's district sales office, 659 Skinner Bldg., Seattle 1, Wash.

Both Mr. Tuel's educational background and business experience have been chemical—largely in the metal processing industries. For 3 years he

David H. Tuel

PIONEERS *and* LEADERS

in ELECTROLYTIC PRECIOUS METALS

DAVIS-K GOLD PLATING SOLUTIONS

Through the years, Davis-K has continued to lead the field in producing low cost solutions, time-saving procedures and revolutionary new electroplates. From Davis-K research laboratories have come two of the most outstanding developments in recent years.

ONE OPERATION

***First* with Antique Gold Solution**

An inexpensive, quality electroplate with excellent color consistency and remarkable ease of operation.

***First Again* with HARD GOLD SOLUTION**

FOR PRINTED CIRCUITS AND ELECTRONIC PARTS

Davis-K Hard Gold Plating Solution is an amazing new electroplate for the electronic industry which cuts gold deposit 50% while forming a lasting bond with either metals or plastics. Requires no elaborate set-up, has maximum resistance to high frequency, plates at low temperature and eliminates control problems.

OTHER DAVIS-K PRODUCTS

★ POTASSIUM GOLD CYANIDE SALTS

★ LUSTROUS WHITE RHODIUM SOLUTION

Now available: variable-type Tank Rheostats, specially designed for precious metal plating.

FREE Consultive Service!

As an added service, Davis-K process engineers are available for consultation concerning special plating problems and installations.

ALL DAVIS-K GOLD PLATING SOLUTIONS ARE:

- made in all colors
- color constant
- tarnish-resistant
- brilliant in finish
- bottled by Troy weight
- made from assayed US Treasury Gold only
- Ready for immediate use

We are fully equipped to reclaim old gold and rhodium solutions. No charge for small sample plating. Write Dept. MFG-57 for details!

"Where Glittering Elegance Reflects Lasting Quality."

100% PURE GOLD SOLUTIONS DKP

DAVIS-K PRODUCTS, CO.

135 West 29th St., New York 1, N. Y.

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was a pilot plant operator in a chemical development company. For the past 6 years, Mr. Tuel has serviced users of industrial cleaning chemicals in the metal fabrication, aircraft and transportation industries.

Baird Machine Elects Blaisdell, V. P.

The Baird Machine Co., of Stratford, Conn., has announced the election of *Durwood A. Blaisdell* as executive vice president of the company at the annual meeting on June 20, 1957. Mr. Blaisdell will immediately assume general management responsibility for all operations, which include the manufacture of barrel finishing machinery.

Fischer & Porter Names General Sales Manager

Robert L. Rice has been promoted to general sales manager of *Fischer & Porter Co.*, manufacturer of complete process instrumentation. He joined the firm in 1950 as a sales engineer, becoming sales manager of the Cincinnati office a year later. For the past three years he has been manager of the Water and Waste Division, which manufactures and distributes chlorination equipment. *James Haskett* replaces Mr. Rice as manager of the division.

Mr. Rice was graduated from the University of Cincinnati with a Bachelor of Science degree in Mechanical

Robert L. Rice

Engineering. He is a member of Tau Beta Pi and Pi Tau Sigma fraternities.

Free Course in Electroplating

The course of study in electroplating given at the Fort Greene Evening High School, 29 Fort Greene Place, Brooklyn, N. Y., (formerly Brooklyn Evening Technical High School) will begin its Fall term on September 11, 1957.

The session is divided into classroom discussion and laboratory experiments. The classroom topics will include simple calculations, reading graphs, chemistry of the plating tank, pH, wetting agents, pitting, deionizing. The laboratory experiments will include solution analysis, Hull cell studies, anodizing.

Registration begins September 9, 1957, and daily thereafter from 7:00 to 9:00 P.M. Classes will meet on Tuesday and Thursday from 6:45 to 8:15 P.M. including about six (6) Fridays. The term begins September 11 and ends January 31, 1958. Register with *Mr. L. Serota* in Room BW17 or 3E10.

Hooker Occupies New Sales Office at Philadelphia

Hooker Electrochemical Co., Niagara Falls, N. Y., opened a new district sales office at 6 Penn Center Plaza, Philadelphia 3, Pa., on July 1. *Neil M. Barber* is manager—Philadelphia district sales while *John J. Wojnar* has been named the new office manager. The office will serve Pennsylvania, Southern New Jersey, the eastern part of West Virginia, and all states east of the Mis-

sissippi River and south of Kentucky.

The office will be headquarters for chemical sales representatives *Julian J. Boyce* of Charlotte, N. C., *Joseph J. Lenahan* of Pittsburgh, Pa., and *Charles H. Foster Jr.*, who will move shortly from New York City to the Philadelphia area.

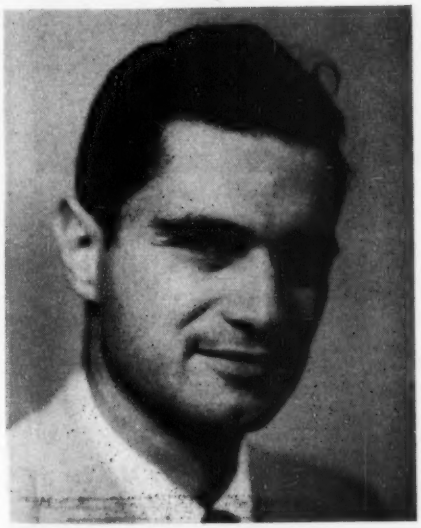
Mr. Barber, a native of Vermont, came to the company in 1942 upon graduation from Dartmouth College. He transferred to sales in 1945, and has represented the firm in the Philadelphia area since 1948, being named district sales manager a year ago. He is a member of the Chemical Club of Philadelphia and the Delaware Valley Tanner's Club.

Mr. Wojnar served four years in the Navy, where he became an aviator and, in 1954, was graduated from Wilkes College with a B. S. degree. Formerly of Ashley, Pa., he joined the company in 1954 as an analytical chemist in the research and development department, transferred to the sales coordination group in January, 1956, and has recently moved from Niagara Falls to Elkins Park.

Michigan Chrome Appoints Fossati

Michigan Chrome & Chemical Co. announces that *Chuck Fossati* has been appointed sales representative for northern Ohio, western New York, western Pennsylvania and Canada.

Mr. Fossati received his MA from the University of Michigan in 1951, and entered the Chemical Division's sales training program early in 1956. He will headquarter in the Buffalo, New York, area.



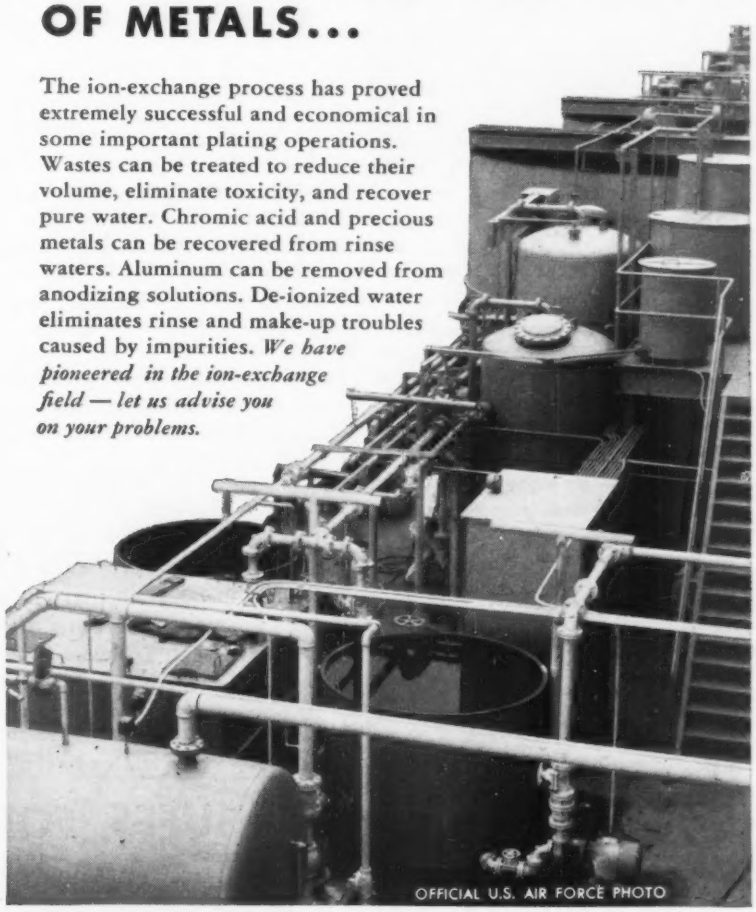
Chuck Fossati

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILL.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.
NEW YORK OFFICE: 411 E. 44th St., New York 17, N.Y.

ILLCO-WAY ionXchange

FOR WASTE TREATMENT AND RECOVERY OF METALS...

The ion-exchange process has proved extremely successful and economical in some important plating operations. Wastes can be treated to reduce their volume, eliminate toxicity, and recover pure water. Chromic acid and precious metals can be recovered from rinse waters. Aluminum can be removed from anodizing solutions. De-ionized water eliminates rinse and make-up troubles caused by impurities. *We have pioneered in the ion-exchange field — let us advise you on your problems.*



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Minnesota Mining Elects Officers

Election of *Robert H. Tucker* as secretary of *Minnesota Mining & Mfg. Co.*, and *Irwin R. Hansen* as treasurer of the company, was announced recently.

Tucker succeeds *John L. Connolly*, who has reached retirement age. Connolly, also general counsel for 3M, has been asked to continue on in that capacity for an indefinite period. He will also continue as a director.

Hansen succeeds *Clarence M. King*, who had been treasurer and assistant secretary since 1950. King, who has reached retirement age, has been asked to continue to serve in an advisory capacity for an indefinite period.

Tucker joined the firm as assistant general counsel in 1942, and has been assistant secretary since 1947. He is a member of the St. Paul Board of Education, and a director of the St. Paul Y.M.C.A.

Connolly, who joined the company in 1937, has been secretary since 1939, and general counsel since 1951. He was elected to the board of directors in 1946. Prior to joining 3M, he engaged in private law practice for many years, and was corporation counsel for the city of St. Paul from 1934 to 1937.

NEW

Luster-on®

52 POWDER

PROTECTS and BRIGHTENS ZINC at LOWEST COST YET

LUSTER-ON 52 POWDER *is a low, low priced single dip, no-leach conversion coating for zinc plated surfaces.*

LUSTER-ON 52 POWDER was recently developed by The Chemical Corporation for automatic equipment where facilities are not available for added leaching and rinsing.

LUSTER-ON 52 POWDER gives a bright bluish hue; provides lasting corrosion protection against staining, tarnishing and white powder products.

LUSTER-ON 52 POWDER can *now* be used in cases where cost has prohibited use of chromates in the past. For instance, electrical conduit, conduit boxes, screws and builder's hardware, tools, electronic parts, air conditioning parts, automotive parts, cheap toys.

LUSTER-ON 52 POWDER is not only low, low in price, but eliminates expensive handling, space-consuming storage and carboy deposits.

Still available, of course — time-tested Luster-On liquid dips and coatings for all your needs.

Data Sheets and Prices on Request. Send in part for free processing.

West Coast: Crown Chem. & Engr. Los Angeles & San Francisco
Canadian Licensee: Alloycraft Ltd. Montreal

THE *Chemical* CORPORATION

58 Waltham Ave. • Springfield 9, Mass.
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E. E. Houghton to Increase Detroit Facilities

E. F. Houghton & Co. announces expansion of its manufacturing facilities in Detroit, more than doubling the plant size. Plans have been drawn and bids are being obtained for new factory, office and laboratory space adjoining the present location at Lumpkin Ave. and Detroit Terminal R.R. Ground will be broken in June and the plant is expected to be ready for manufacturing before the end of 1957. Between the old and the new plant, a fully equipped laboratory will be provided for control and customer service.

Served by a freight siding and by motor trucks, prompt deliveries in the Detroit area will be assured. A lot 360 feet long beyond the building provides necessary drum storage and driveway facilities. *George P. Wilson*, present superintendent, will be in charge locally under the direction of *Dr. James T. Eaton*, vice-president-production.

W. C. Van Keuren

Wyandotte Chemicals Appoints Two New District Managers—Transfers One—Retires One

W. C. Van Keuren has been appointed manager of the New York district office of *Wyandotte Chemicals Corp.* effective July 1. He joined the Boston district sales staff in 1945 and became manager of the Philadelphia office in 1952. *John K. Stanz*, for the past five years a member of the Philadelphia district office sales staff, suc-

John K. Stanz

BUFFS FOR INSIDE POLISHING

GOBLET BUFFS, TAPER BUFFS, CYLINDER BUFFS, SMALL POLISHING WHEELS, RAZOR EDGE BUFFS, and many others for deburring, polishing and grinding any internal contour.

Write for additional information or contact your local dealer. These buffs are stocked by many dealers throughout the country.

We manufacture a COMPLETE LINE OF BUFFS including full disc loose and sewed buffs and polishing wheels. Our metal center BIAS TYPE BUFF may help cut your polishing costs.

Your request on your letterhead will bring our complete catalog by return mail.

BARKER BROTHERS INC.
ESTABLISHED 1911
1660 Summerfield Street **Brooklyn 27, N. Y.**
Canadian Distributor — LEA PRODUCTS COMPANY, Montreal

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Robert W. Haberl

A. J. Bettelheim

ceeds Mr. Van Keuren as district sales manager.

Robert W. Haberl has become sales manager of the Kansas City district. Mr. Haberl has been acting manager since the death of *Gail Eldridge*, having been transferred from a sales management position at the Wyandotte office.

A. J. (Larry) Bettelheim, the New York district sales manager for 17 years, was granted early retirement. Mr. Bettelheim was recently the guest of honor at a luncheon attended by the entire J. B. Ford Division home office staff.

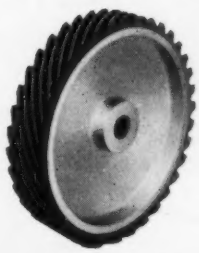
Ransohoff Elects New Vice President

Bernard S. Reckseit has been named vice president in charge of engineering by *Ransohoff, Inc.*, Hamilton, Ohio, one of America's oldest manufacturers of metal cleaning and finishing equipment and systems.

Mr. Reckseit, a native of New York City, is a graduate of the Massachusetts Institute of Technology and has served as a mechanical engineering consultant to industry. He joined the company in 1947 as engineering assistant to the president. Following the death of *Nathan Ransohoff*, founder, chairman of the board and chief engineer, Mr. Reckseit was appointed chief en-

Now Available!

LIVE RUBBER



CONTACT WHEEL

The New **Duro-Red Live Rubber** contact wheel — Faster, smoother, cleaner grinding and polishing.

It's the **Live Rubber** that makes the difference. It's been proven!

WRITE TODAY FOR INFORMATION.

THE NAZAR RUBBER CO.
2727 Avondale, Toledo 7, Ohio

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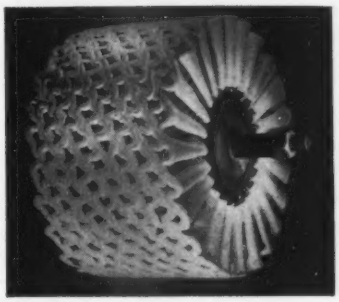
Cooler, Faster Buffing
with
45° Spoke Buffs



Patented spoke mounting principle maintains best cutting angle of 45° for faster, smoother cutting with less pressure and no streaks. Ventilation from 24 openings.

Write for folder.

GUARANTEED BUFF CO., INC.
20 VANDAM ST., NEW YORK 13, N. Y.

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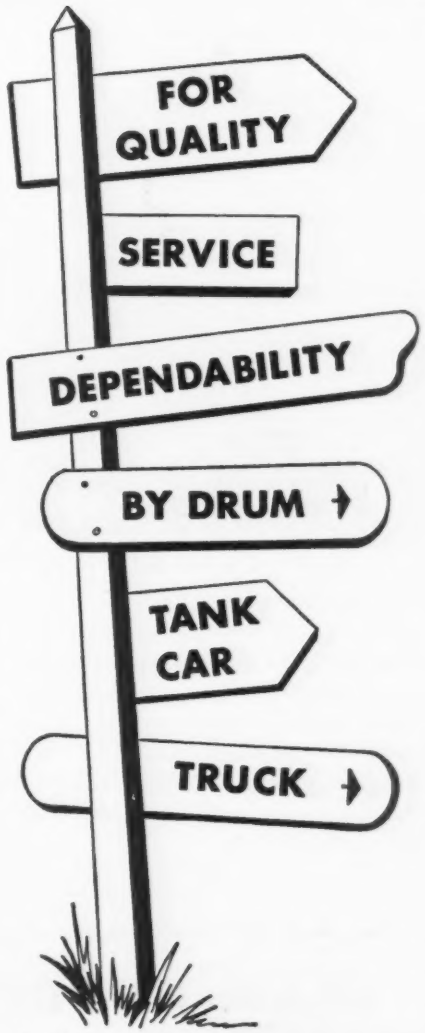

...all roads lead to

SOLVAY HYDROGEN PEROXIDE

Write for SOLVAY Hydrogen Peroxide 24-page fact book and chart of handling precautions. No cost!

SOLVAY®

SOLVAY PROCESS DIVISION

Allied Chemical

ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

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Bernard S. Reckseit

gineer in November, 1956.

Mr. Reckseit is a registered professional engineer with extensive background in the design of metal cleaning and finishing equipment. He is active in the American Society of Mechanical Engineers, National Society of Professional Engineers and Cincinnati Engineering Society.

Canadian Permag Observes Twenty Fifth Anniversary

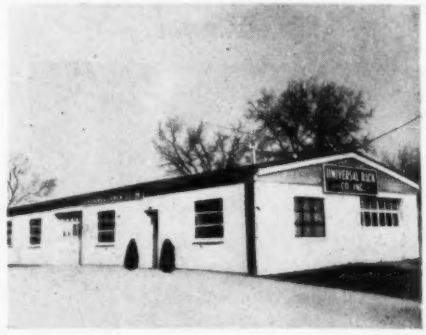
The 25th anniversary of its establishment in Canada was observed at the annual meeting of *Canadian Permag Products, Ltd.*, on June 4th in St. Lambert, Quebec. The high point of the meeting was the formal opening of extensive additions to the St. Lambert plant, necessitated by the corporation's continuing rapid growth since a new building was erected in 1954.

Officiating were *Allen Rylander*, president, and *Ingrid C. Magnuson*, president of the parent company, *Magnuson Products Corp.*, Brooklyn, New York. *P. Edward Magnuson* and *Russell F. Burch*, representing both companies, were in attendance.

Universal Rack Opens Plant in South

Announcement has been made of the opening of a new plant by *Universal Rack Co., Inc.*, in Lebanon, Tenn. This manufacturing operation has been established to supply all types of engineered racks and fixtures to the plating, organic finishing and material handling industries.

The new plant has been located in a modern one story building on 111 W. Forest St., in Lebanon. This building has been renovated so that all phases of rack manufacture will actually be completed within the plant. The facilities include equipment for the manufacture of plating and anodizing racks including tanks and ovens for the insulation of these parts. One of the principle types of racks to be manufactured here will feature new removable and replaceable work holders which will permit easy replacement of tips as required.



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Metropolitan Distributors

HANSON-VAN WINKLE-MUNNING CO.

Complete Service for Metal Finishing

Products Listed Below Available in New York Stock With Reasonable Exceptions

GENERATORS

Anodes, All Kinds	Tallow	Nickel Salts
Brushes	Rouge	Copper Salts
Buffs	Emery Paste	Cyanide
Chemicals	Cleaners	Tanks, All Kinds
Tripoli Comp.	Emery	Plating Barrels
Acme White Finish	Glue	Polishing Wheels
		Polishing Lathes

195 LAFAYETTE ST., COR. BROOME

Phone CAnal 6-3956-7 NEW YORK 12, N. Y.

FILTERS

MAIZO Drying Materials

LEA Buffing & Polishing PRODUCTS

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The KOCOUR SULFATE TEST SET with ELECTRIC CENTRIFUGE

. . . determines sulfate content in a chromium plating bath . . . directions are easy to follow . . . no calculations necessary . . . readings are directly in ounces per gallon. Write for descriptive literature.

● KOCOUR testing sets are used all over the world for controlling plating — cleaning — pickling — anodizing — and hardening processes . . . special sets can be provided for your requirements.

Write today for complete information — no cost or obligation.

KOCOUR COMPANY

4801 S. ST. LOUIS AVENUE

CHICAGO 32, ILLINOIS

Specify KOCOUR test sets from your supplier.

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Duke Tyler Scott

Duke Tyler Scott, general manager, is particularly well known in the plating industry as he has spent the past four years at the General Electric Co. in Appliance Park, Louisville, Ky. as plating process planner in their Home Laundry Department. A native of Kentucky, he attended Indiana University and has also held the position of quality control analyst with the Colgate Palmolive Co. At present he is an officer in the Indiana National Guard, and is a member of the honorary scholastic fraternity — Alpha Delta Kappa. He is also an active member of the A.E.S. in the Louisville, Ky. Branch.

To carry the sales for this new firm, *Harry Tenpenny* has been appointed as sales engineer. A native of Tennessee, he is the father of four children and a veteran of World War II, seeing service in Europe in the Air Force. Prior to this he was associated with the F.H.A. and is known to many of the electroplaters in Nashville through his business activities in that city. Mr. Tenpenny is also a member of the Atlanta Branch of the A.E.S.

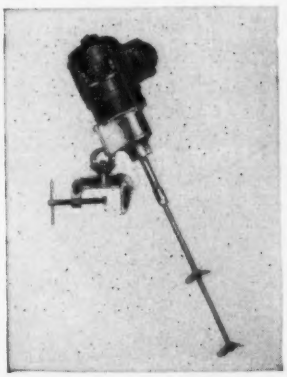
Harry Tenpenny

Chemclean Products in New Location

Chemclean Products Corp. announces the removal of their offices, laboratory and factory to their new, modern quarters at 15-08 - 121st St., College Point 56, N. Y. Telephone numbers are Hickory 5-2330 - 2331 - 2332.

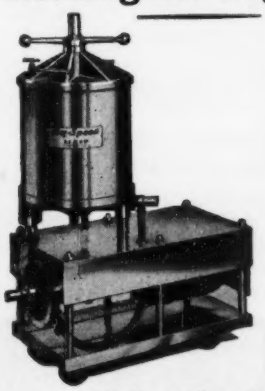
Wiretex Appoints F. H. Ross & Co. Southeastern Distributor

Wiretex Mfg. Co., Inc., Bridgeport, Conn., manufacturers of a complete line of wire mesh products for industry, has appointed the *F. H. Ross & Co.*, Charlotte, N. C., as distributors in the Southeast.



This Portable
MIXER
Will Speed Up
YOUR
Cleaning and Degreasing Operations

★



This Portable
FILTER
Will Speed Up
YOUR
FILTERING, TOO

Write today For ALSOP Catalogue
ALSOP ENGINEERING CORP.
1208 BRIGHT STREET, MILLDALE, CONN.

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*Koroseal** LINED TANKS . . .

PPI

Advantages:

• High resistance to strong corrosives, which cannot be handled with rubber • Tough; will not rip • Abrasion resistant • Easily repaired • High electrical resistance, eliminates stray currents • Easily tested for leaks with electric tester • Waterproof; resists action of oil, air, sunlight, and gas • Can be supplied in thicknesses of 3/32", 1/8" and 3/16" • Not affected by most acids.

*Koroseal** Permanently Bonded to interior of Steel Tank — Can be Bonded to Welded Steel, Wood, and Concrete Bodies in a wide Range of Sizes and Shapes.

PPI

- STEEL TANKS
- STAINLESS STEEL TANKS
- LEAD LINED TANKS

Custom Built Tanks . . . to Your Specifications

PPI — Tanks are built to your needs and specifications. Send us dimensions and any other particulars such as overflow dams, nipples, etc., and we will be happy to quote prices.

*B. F. GOODRICH REGISTERED TRADE-MARK

Dependable PPI Products . . .

• PLATING RACKS • RUBBER DRUM LINERS • ACID CONTAINERS • ANODE HOOKS • FIBERGLAS TANKS, DUCTS & HOODS • PLASTIC COATED DIPPERS & PAILS • STEEL TANKS • STAINLESS STEEL TANKS • LEAD LINED TANKS • PLASTIC LINED TANKS • POLYETHYLENE PAILS & CONTAINERS • FUME SEPARATORS • PLATE COILS • LEAD ANODES • TRICHLOROETHYLENE • PERCHLOROETHYLENE • SILVER BRIGHTNER.

PLATING PRODUCTS, Inc.
1309 N. WASHINGTON
KOKOMO, INDIANA

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Some key personnel of F. H. Ross & Co. discuss company's recent appointment as Southeastern distributor for the Wiretex Mfg. Co., Inc. Pictured from left to right are J. M. Lass, sales manager, G. W. Coan III, salesman, T. W. Moore, salesman, J. R. Parham, salesman, M. W. Reimler, technical director, H. M. Bove, salesman and M. W. Couruoisier, salesman.

Ross, with headquarters in Charlotte, N. C., has been serving eleven southeastern states for over a quarter of a century. The company has thirteen office-warehouses, with approximately 225,000 sq. ft. of floor space in eight southeastern states. It serves this vital market with 250 employees and fifty-four company owned trucks, consisting of tractor trailer units, vans, and tank trucks.

The Carborundum Co. Expands Facilities

The Carborundum Co. has launched a $3,200,000 modernization and expansion program at its three silicon carbide furnace plants in the U. S. and Canada, according to an announcement. Participating in the project will be the Niagara Falls, New York plant and Vancouver, Washington plant, both operated by the Electro Minerals Division; and the Shawinigan Falls, Quebec plant of *Canadian Carborundum Co., Ltd.*

The preponderance of the expansion will be placed in the Shawinigan Falls and Vancouver plants. This is because of more favorable power rates at these locations. The limited expansion at Niagara Falls was based on the expectancy that future power at reasonable rates would be made available at Niagara Falls, N. Y.

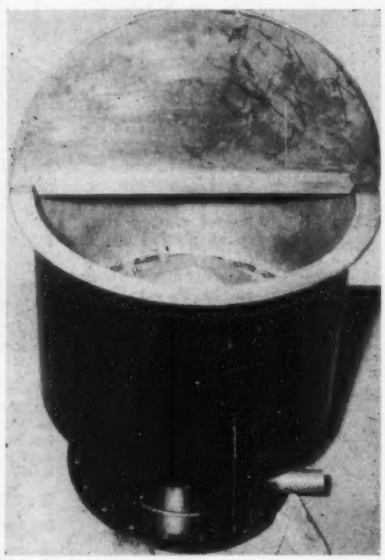
The project will increase the combined capacity of the three plants approximately 25%. Already the world's largest producer of silicon carbide, the increased capacity was required to meet the rising demand for this electric furnace product.

In addition to the expansion aspects of this project, modernization will result in each of the plants affected. Engineering has been completed which will provide new and improved methods for the furnacing and handling of silicon carbide during the manufacturing process.

The new expenditure represents the fourth silicon carbide expansion undertaken by the company during the past nine years.

Octagon Process Appoints Distributor

Octagon Process, Inc., Staten Island, N. Y., has announced the appointment of the *Metal-clean Equipment Co.* as their distributor in the Philadelphia-Camden area, Pennsylvania west to Harrisburg, Delaware and Maryland.



How to live longer with corrosion conditions

. . . two simple rules:

(1) have your processing equipment made of a construction material that has proved to be most resistant under your conditions; (2) specify Stortswelding to be sure of sound, strong, leakproof welds and of preserving the utmost corrosion-resistance of the metal. The end result is longest life and maximum utility for your equipment.

STORTS WELDING COMPANY INCORPORATED

38 Stone Street
MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

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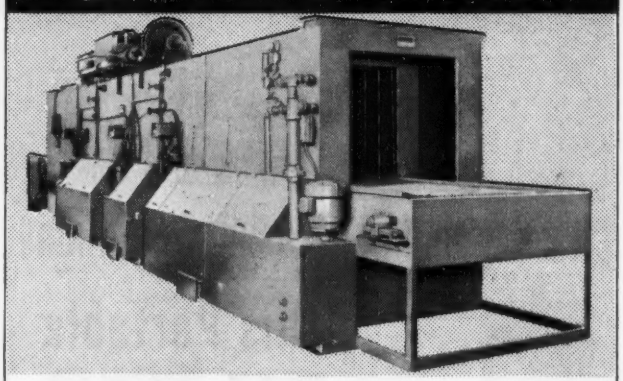

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Requests for literature by prospective users in this area may be made direct to the Metalclean Equipment Co., located at 177 Stoneway Lane, Bala-Cynwyd, Pa.

Wheelabrator Corporation Honors Minich and Pfaff

The directors of *Wheelabrator Corp.*, Mishawaka, Ind., announce two recent appointments: *Verne E. Minich*, founder of the company in 1908, was made honorary chairman of the board, and *Otto A. Pfaff* was elected chairman of the board. Mr. Pfaff will continue to serve as president, a position he has held since 1941.

Duggan Opens New Plant

Duggan Masking Devices have announced the opening of their new and larger plant at 7075 Lyndon Ave., Detroit 38, Mich.

The plant has approximately 20,000 square feet of office and factory space devoted to the production of special and standard spray-painting, plating, and abrasive blasting equipment.

Wizemann Appointed Manager of National Aniline Detergent Sales

The appointment of *Leslie C. Wizemann* as manager - detergent sales, National Aniline Division, *Allied Chemical & Dye Corp.*, has been announced by the company. In this position Mr. Wizemann will be located at the company's general office, 40 Rector St., New York City, and report to *O. M. Morgan*, director - chemical sales.

Mr. Wizemann has been active in the sales development of the Nacconol surface active agents for several years and has been with the division since 1934.

A graduate of Cooper Union Institute with a degree of Bachelor of Chemical Engineering, Mr. Wizemann

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over 25 models designed to fit your needs from 50-3,000 Gal. per hr.

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Leslie C. Wizemann

is a native New Yorker. He is a member of the American Chemical Society and the American Association of Textile Chemists and Colorists, and is an active participant in various other scientific and trade associations.

Nichols to Add to Facilities

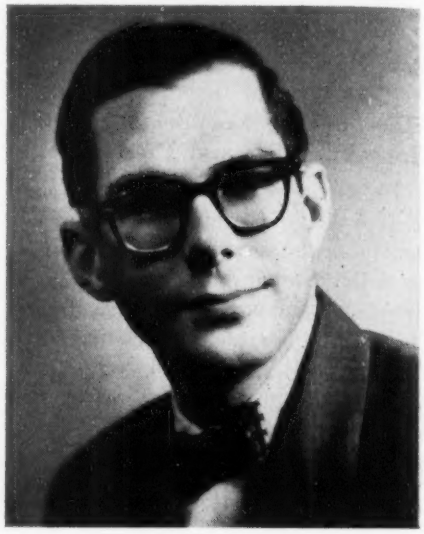
Plans for the manufacturer of a diverse line of industrial fine chemicals have been announced by *Nichols Chemical Co., Ltd.* The plant will be built at their production center in Valleyfield, Quebec which now has one of the largest sulphuric acid manufacturing facilities in eastern Canada. The country's first liquid hydrofluoric acid plant is also under construction at Valleyfield and will be in operation this summer. Among products to be made will be metallic and alkali fluoborates and fluorides, as well as many inorganic salts including nitrates, sulphates and acetates.

The new plant is expected to be in production by December of this year. It marks the sixth major expansion for the company in the past two years. In addition to the Valleyfield sulphuric and hydrofluoric acid expansions, they include Canada's first plant for liquid aluminum sulphate at Thorold, Ontario, the first dry "alum" plant on the west coast at Barnet, B. C. and a large new warehouse and office in Toronto.

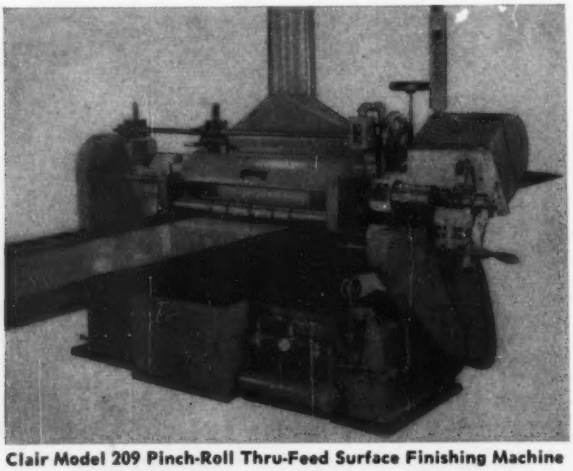
Pfaudler Appoints Sales Rep. in St. Louis

Robert H. Schwaig has been appointed sales representative in the St. Louis, Mo. area for *The Pfaudler Co.* of Rochester, N. Y.

A licensed professional engineer in Missouri, Schwaig is a chemical engi-



Robert H. Schwaig



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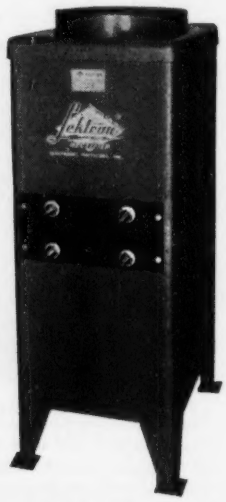

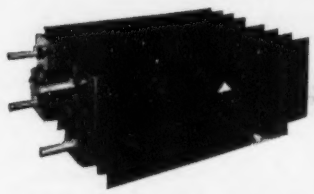

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neering graduate of the Missouri School of Mines and Metallurgy, Rolla, Mo. Before joining Pfaudler in December 1956, he had been associated in engineering and sales capacities with Industrial Process Equipment Co., Olin Mathieson Chemical Corp., and Merck & Co. He is a member of the St. Louis chapter of Alpha Chi Sigma and American Institute of Chemical Engineering.

Whitehead Opens New Warehouse in Winsdor, Conn.

A "Fabrication Forum", sponsored by *Whitehead Metal Products Co., Inc.* featured over 100 experts and technicians from such leading manufacturers as International Nickel Co., Alcoa, American Brass Co., Crucible Steel Co., and many others. The event was held June 4, 5 and 6 to celebrate the opening of the company's new Winsdor Conn. warehouse.

The new 34,100 square foot office and warehouse, eighth in the Whitehead chain, is located on the Hartford-

Springfield Expressway in the new Windsor Industiral Park. It will carry a full line of corrosion-resistant metals and accessories.

NEW BOOKS

Metal Industry Handbook & Directory

Published by Iliffe and Sons Ltd., Dorset House, Stamford St., London S.E. 1, England. 1957. Price 16.6d, postpaid. 536 pages.

The 46th edition of this annual handbook-directory is, as usual, a comprehensive source of information for those engaged in the non-ferrous metal industries. Three-quarters of the volume is concerned with the general properties of metals and alloys and with data and tables. The section on finishing is relatively minor, although probably sufficient for the requirements of metal workers. The buyers' directory is a particularly useful section for British readers and is quite detailed. The handbook is issued free of charge to subscribers of the weekly journal *Metal Industry*.

The Chemical Formulary—Vol. X.

Edited by H. Bennett. Published by Chemical Pub. Co., Inc., 212 Fifth Ave., New York 10, N. Y. 1957. Price: $8.00. 392 pages, including index.

This tenth volume of a successful and popular series, compiled by a staff of experts, contains hundreds of new formulas on a wide variety of subjects. Although prepared for the layman, rather than the technical specialist, it can be useful whenever

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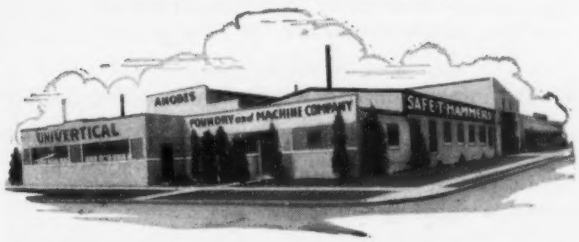

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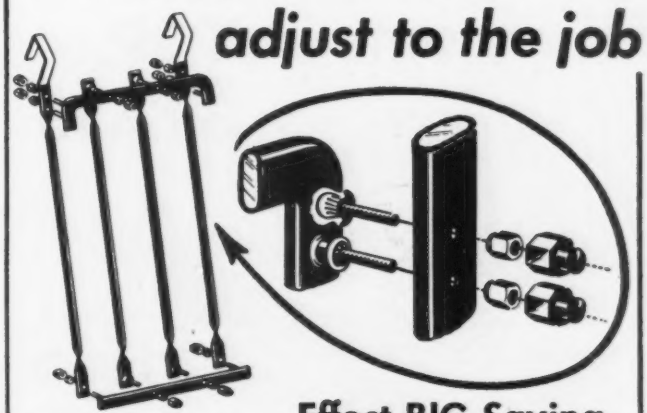

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the need arises for a formula which is outside the field of one's specialization. An interesting section lists sources of supply for a large number of uncommon chemicals and other materials, which alone would make the book worthwhile for the finisher's library.

The Chemistry of Organometallic Compounds

By E. G. Rochow, D. T. Hurd & R. N. Lewis. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1957. $8.50. 320 pages plus author and subject index.

This volume is a unified coverage of all phases of these compounds, their structure, properties, preparation, reactions, and applications, not excluding general considerations and theoretical aspects. Although the subject matter is, obviously, of interest to the chemist rather than to the plater, the growing importance of organometallic compounds in the metal finishing field as addition agents for brightening purposes would indicate the desirability of a book of this type for chemists engaged in the study of these products.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Newark Branch

The May meeting of the Newark Branch was held at the Anheuser-Busch Brewery in Newark with some fifty members present. The meeting was primarily concerned with the important job of sampling and the problem was assiduously attacked. After a tour of the brewery, several films were observed and a short business meeting was held with Vice President *Dodd Carr* presiding.

D. Gardner Foulke
Secretary

Miami Branch

The May 24th dinner - meeting was held at Jerry's Restaurant. Honor guest was *Dr. Samuel Heiman*, national president of the Society, who presented the new charter to the members, and gave an informative talk concerning the functions of various national officers. He also provided some very interesting insight into plating troubles and cures.

The newly elected officers were installed, as follows:

President—*M. H. Dent.*
1st Vice President—*E. Owens.*
2nd Vice President—*J. Gibbs.*
Secretary - Treasurer—*R. F. Wharton.*

Robert F. Wharton
Librarian

Indianapolis Branch

Twenty four members were present at the May 1, 1957, meeting at Fox's Steak House. *Marshal Whitehurst*, president, opened the meeting with introductions and then asked for the secretary's report which was accepted as read. *Loren Stevens* read the treasurers report. *Fritz Anderson* reported that the Tri-State meeting turned out a success, including a check to the branch for $250.

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Election of officers for 1957-58 followed with the following results.

President—*Bert Hawhee.*

1st Vice Pres.—*John Hood*

2nd Vice Pres.—*Loren Stevens.*

Secretary—*Paul Freeman.*

Treasurer—*John Holland.*

Librarian—*Addison Howard.*

Board of Managers; *Robert Smith, Roman Bender,* and *Robert VanHouten.*

Delegates to Tri-State: Sr. *Fritz Anderson,* Jr. *Quentin Shockley.*

Delegates to National Convention "58": *John Hood, John Holland, Paul Freeman.*

Votes were tallied by *Edna Rohrabaugh* and *Herb Kennedy.*

Mr. Stevens presented *Dave Sivertsen,* one of our own members, who gave a first hand view of the paper "The Plating of High Density Tungsten Metal Alloys" which is a joint work of VanHouten and Sivertsen. Several questions and answers followed and all present learned many new items.

Quentin Shockley made a motion to thank the retiring president, *Marshall Whitehurst,* which was seconded and carried by a standing vote.

Bert Hawhee will preside at the next meeting in September.

Meeting adjourned at 9:45 P. M.

Paul Freeman
Secretary

Los Angeles Branch

Los Angeles Branch varied the regular schedule of its monthly educational sessions by switching the June 12 meeting from Rodger Young Cafe, Los Angeles, to the main offices of the Rheem Automotive Mfg. Co. in Fullerton, Calif., and combining the program with a tour of the firm's elaborate metal finishing facilities.

The magnet of attraction for this first 1957 field trip of the branch was the multi-million dollar factory at 601 South Placentia Ave. in Fullerton, 15 miles east of downtown Los Angeles. The completely automatic plating and polishing facilites, which were placed in operation last December, reportedly represent a $4,000,000 slice of the totai $20,000,000 cost of the Rheem factory, which is designed for automobile bumper fabrication and finishing.

Branch President *George Magurean* held the business meeting to a minimum in order to allow ample time for the plant tour. The dinner and meeting began at 6:15 p.m., and the tour got underway at 7:30 o'clock. Membership chairman *George J. Hetz* reported on progress of the membership drive and urged members not to let their efforts sag during the summer months when no meetings are held. The current drive began April 1 and will continue to March 31, 1958, with various prizes being offered for those signing up the most new members. Regular monthly business meetings and educational sessions will be resumed on Wednesday, September 11, at Rodger Young Cafe.

Top echelon members of the Rheem executive staff extended themselves to make the A. E. S. members welcome. General manager *Frank S. Fisher,* and vice-president *O. W. Carrico* were on hand to welcome the group; and Public Relations Director *A. N. Coleman*

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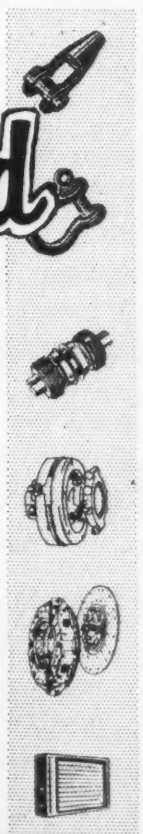

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worked dilligently before and during the tour to assure that the vistitors had an opportunity to inspect every operation and machine in the plant.

Blue Ridge Section

The June 28, 1957, meeting of the electroplaters of the southern Virginia and northern North Carolina section was held at Virginia Polytechnic Institute, Blacksburg, Va. Twenty-two platers, faced the bad weather resulting from hurricane Audrey, enjoyed a steak dinner at the Faculty Dining Room, and participated in the meeting following.

The group agreed to adopt the name "Blue Ridge Section," avoiding local connections since the group covers a wide territory. *T. B. Boggess* was selected temporary chairman and *N. F. Murphy* acting secretary. A nominating committee consisting of *Bruce Wallace, Carl Witherspoon,* and *C. S. Harper* were elected to present a slate of regular officers at the next meeting. Mr. Murphy reported on progress of the application for temporary charter.

Paul Johnson, field engineer for the G. S. Blakeslee Co., discussed the varieties of machines which have been developed for cleaning and degreasing and *J. J. Maguire,* technical representative for the Branson Ultrasonic Corp. answered questions on the applications of ultrasonic energy to cleaning and degreasing.

The next meeting will be held in Roanoke in September.

N. F. Murphy

British Columbia Branch

Over thirty members and their wives enjoyed the social get-together on June 19, at the B. C. Building, P. N. E. Grounds, which constituted the last general meeting of the 1956-1957 season.

After a short cocktail gathering in the lounge the party toured the upper exhibits in the building, including a ride on the gantry viewing the largest relief map in the Commonwealth, that of the province of British Columbia, in its entirety, under the guidance of Mr. Evans of the P. N. E.

This was followed by light refreshments in the lounge before the tour continued on the lower floors. The highlight of the evening was three films shown in the theatre as follows: "Rival World," the remarkable insect film made by the Shell Corporation with its extreme closeups of insects eating; scenes from the "Great Chase" with W. C. Fields; and finally the wonderfully complete and colorful story of "Mining For Nickel" produced by the International Nickel Co. of Canada.

The first meeting of the 1957-1958 season will be held in mid-September.

J. Lee
Secretary

Chicago Branch

The June 14 meeting of the Chicago Branch was held at Nielsen's Restaurant, chosen because it was found that a majority of the members live north to north-west of the location of the restaurant. There was a good attendance of members at this meeting. After the social and dinner hour, *R. Scott*

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Modjeska gave a gala introduction of the speaker for the evening, *Paul Glab*.

Mr. Glab who serves the branch as secretary, is Superintendent of Northwestern Plating Works in Chicago. The paper on "Barrel Finishing" was a joint effort of the Chicago Branch and will be presented at the annual convention in Montreal. Mr. Glab spoke about the different types of barrels used for plating. With the aid of slides he discussed the various automatic plating machines and the different methods of cooling barrel plating solutions such as heat exchanger and refrigeration systems. He also discussed the various cleaning and pickling systems with the use of barrels. The talk was very interesting and illustrative, and an informative question and answer period followed.

Christopher Marzano
Publicity Chairman

LEAD INDUSTRIES ASSOCIATION

As part of its continuing program of providing technical aid to industrial users of lead, the *Lead Industries Association* has announced that a study of research aims has been authorized. The contract with *Battelle Memorial Institute* of Columbus, Ohio, is for a study on the "Evaluation of Research Needs and Formulation of a Research Program" for the lead industry.

The objectives of the study are to provide a guide for future research to be undertaken by the Association. Battelle will screen and evaluate possible research approaches, and will formulate a balanced program based on these findings.

Particular emphasis is being laid on new industrial uses for lead, its compounds and alloys, as well as on developing new lead products. The study is expected to require about 6 months, and when completed, will serve as a guide to the Association's Technical Steering Committee, which plans cooperative research for the lead industries.

Work on the project is now under way, and final results are expected to be delivered to the Association before the end of 1957.

News from California

By Fred A. Herr

The DeVilbiss Co. of Toledo, Ohio, was expected to have completed the transfer of its direct factory branch facilities for Northern California by the end of June. The move was made from former branch offices at 2725 Lafayette Ave., Santa Clara, to 1335 N. 10th St., San Jose. The new quarters contain 10,000 square feet of floor area and are equipped for sales, service, engineering, repair, and inventory. Complete service for company products for Northern California and Northwestern Nevada will be provided by the new branch. Divisional sales manager, *D. L. Bohon*.

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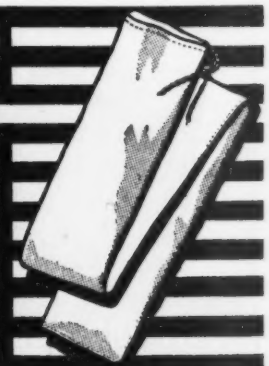

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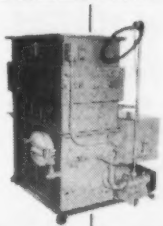

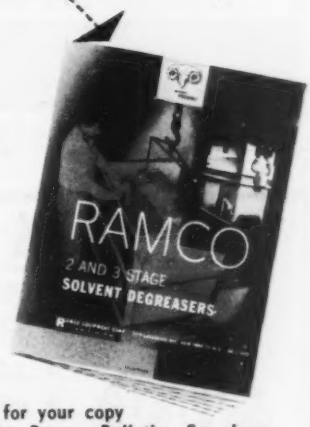

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RAMCO EQUIPMENT CORP.
DIV. OF RANDALL MFG. CO., INC.
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facilities followed the recent opening of new branch facilities in Los Angeles for services to the Southern California and Arizona territory; and enlarged sales and service facilities in Salt Lake City, Utah, and Seattle, Wash.

A system of what might be called long-distance or remote control spray application which reportedly quadruples finishing speed on airplane parts is now in use in the El Segundo, Calif.; plant of of Douglas Aircraft Co. Douglas employs in that plant a recently developed airless spray rig which, it is reported, makes practical the use of spray guns in shop areas where such high-speed finishing units were not practical in the past.

The new airless spray rig, according to reports, is practical for coating surfaces as far as 10 feet from the nozzles. The system is said to be so adaptable that lengths of finishing hose up to 150 feet can be used.

Basically, the process involves high-pressure pumping of a finishing solution through a pair of heat exchangers, in which hot water lifts the coating temperatures, to an extruded neoprene hose which is equipped with three channels. Two channels maintain elevated coating temperatures by recirculating hot water around a central channel which feeds paint to a spray gun. While practically all types of organic finishes could be applied with the unit, the Douglas Company at present uses it only for applying flat mill-white paints—alkyd or oil-base, which have viscosities ranging from 80 to 100 Kreb units at room temperature, or 55 to 65 Kreb units at 160°F, the temperature at which they are usually applied with the airless equipment.

Reports from the Douglas Company indicate that finishing operations are being completed four times as fast with the airless spray rig than would be possible with standard spray equipment.

As part of a $300,000 expansion program, the U. S. Porcelain Enamel Co. of Los Angeles recently completed installation on what is claimed to be the largest furnace in the west for firing of porcelain enamel. One hundred and five feet long and equipped with 13 burners, the furnace permits controlled temperatures throughout its length. Each burner is individually controlled by the latest type thermostatic equipment, and eliminates imperfections due to variations in temperature as pieces travel through the firing process.

The expansion program also included extension of facilities in the warehousing, shipping and office divisions.

Louis D. Alpert, manager of the Los Angeles, Calif., plant of the Federated Metals Division, American Smelting & Refining Co., has been appointed general manager of the division's east-

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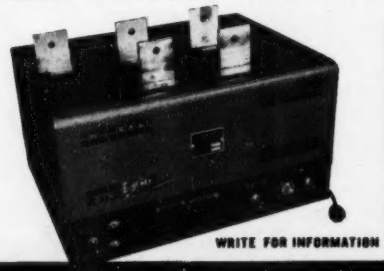

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ern department. Mr. Alpert joined Federated as a research chemist in 1935 and, since 1942, has been connected with the company's west coast operations.

A new addition to the field engineering staff of the Norton Co. in the Los Angeles area is *Paul A. Bisnette*, who recently completed his sales training course at the main office in Worcester, Mass.

Stauffer Chemical Co. has construction under way on an addition to its research laboratory in Richmond, Calif., near San Francisco.

Costing several hundred thousand dollars ,the new addition was expected to be ready for operation late this fall and will provide additional facilities for development of new inorganic plastics, special metals and high energy fuels.

Jack W. Schultz, head of Jax products, Los Angeles plating chemical and supply firm, reports the appointment to his sales engineering staff of *Martin Schneider*, who will service platers in the San Fernando Valley area of Los Angeles. Schneider was formerly on the sales force of Hart Products in New York City.

A new plant equipped to engage in custom coating by the Whirlclad coating process was opened in June at 3030 Oak St., Santa Ana, Calif., by the Polymer Corp. of Reading, Pa.

The company will operate the West Coast shop under a license from Polymer Processes, Inc., which holds the exclusive U. S. patent and licensing rights to the German-developed fluidized bed technique of application. The process has been distributed in California through the E. Jordan Brookes Co. of Los Angeles.

Kaiser Aluminum & Chem. Co. of Oakland, Calif., reports completion of pilot plant installations in its Spokane, Wash., plant for use in experimental work in a broad range of aluminum finishing operations.

The pilot plant is equipped to handle a wide variety of finishing operations, including electroplating, anodizing, porcelain enameling and organic finishing. An electroplating line is available with 120 gallon tanks with individually controlled current sources for separate adjustment at various tanks. Panels up to 24 x 32″ or smaller parts can be processed. Facilities are also available for cleaning, etching, bright dipping zincating, stripping, conversion coating, and plating by commercial and experimental methods. The organic coating equipment consists of a spray booth, roller coater, dip coater, and equipment for conventional painting, lacquering, enameling, varnishing, mixing, and blending.

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dent of *Alsop Engineering Corp.*, died recently. He had been associated with the firm for thirty years, for the last twenty in charge of the New York office, from which he supervised sales in the greater New York area, including export activities.

SILVIO C. TAORMINA

The plating and metal finishing field was saddened to learn of the death of one of its outstanding leaders, Silvio C. Taormina. The popular champion of the job plater died recently of heart failure at the Long Island College Hospital, Brooklyn, N. Y., following a year's illness. He was 54.

Born in Sciacca, Sicily, April 13, 1903, the long-time executive secretary of the Masters' Electro-Plating Association of New York came to the U. S. in 1906. He was educated in New York schools and received his B. S. in

Chemical Engineering from both Pratt Institute and Brooklyn Polytechnic Institute.

More recently he served on the nickel committee of the National Association of Metal Finishers. He was one of the job plating industry's leaders in the fight for an equitable distribution and allocation of nickel and job plating industry recognition by Washington officialdom.

Taormina is survived by his wife, Mrs. Kate (Wachtel) Taormina, New York; a married daughter, Mrs. Ira Cohen, and two granddaughters, of Buffalo, N. Y.; his father, Antonio Taormina, the Bronx, N. Y.; and a sister, Mrs. Rose Sanfillipo also of the Bronx.

He was associated in business with Unit Process Assemblies, Inc., Platers' Supply Co., and Platers' Research, Inc., of both New York and Chicago.

ERIC S. ANDERSON

Eric S. Anderson, sales manager, Industrial Division of *Sparkler Mfg. Co.*, died suddenly April 29 in his home in Libertyville, Ill., at the age of 47, leaving a wife and two children. Anderson joined the filter manufacturer in 1945 and held positions in production, purchasing and sales before being appointed division sales manager.

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SITUATION WANTED—Chemist, presently doing graduate work at night, with seven years of heavy duty electroplating and metallurgical analytical experience, is looking for a position with a future. Address: July 3, care Metal Finishing, 381 Broadway, Westwood, N. J

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SITUATION WANTED — Can handle personnel, set up production and cost control, perpetual inventory of raw materials and work in process. Heavy experience in the manufacture of wrought iron furniture and electroplating. Address: July 4, care Metal Finishing, 381 Broadway, Westwood, N. J.

FOREMAN POLISHER

SITUATION WANTED—I have many years experience on all metals. Capable of handling men and teaching beginners. Production and estimating on all types of work—floor lamps, hardware, silverware, plumbling supplies, jobbing shops and chandeliers and electrical fixtures. Desire position in metropolitan New York, Aldress: August 4, care Metal Finishing, 381 Broadway, Westwood, N. J.

PLATING ENGINEER

SITUATION WANTED — Desire position as plating engineer, general foreman, consultant or installation engineer of plating equipment. Have had better than twenty four years experience in all types plating and finishing in both aircraft and commercial. Interview desired. Address: August 5, care Metal Finishing, 381 Broadway, Westwood, N. J.

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SITUATION WANTED—26 year old experienced German electroplater desires position in U. S. Presently foreman in firm manufacturing hardware. Can handle all solutions including anodizing and lacquering. Speaks some English. Requires letter guaranteeing position to emigrate. Write: Karl H. Kramer, Sulzberg 19, Alpirsbach, West Germany.

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Rapid Electric Selenium Type 5000A, 0-6 Volt.
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Koroseal-lined Tanks, 7' x 4' x 4'6".
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400	60/60	G. E.
500	6	Chandeysson
500/250	6/12	Elec. Prod.
750/375	6/12	Excel
940	32	Elec. Prod.
1500	15	Star
1500	30/50	Century
1500	40/65	G. E.
1500	65	Westinghouse
1500	70	Century
2500/1250	6/12	Elec. Prod.
5000/2500	6/12	Columbia
5000/2500	9/18	Chandeysson

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7—Industrial Filters Rubber Lined 10 x 28, 14" x 36, 10 x 22.
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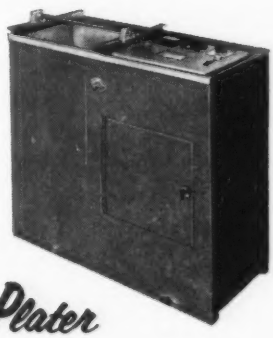

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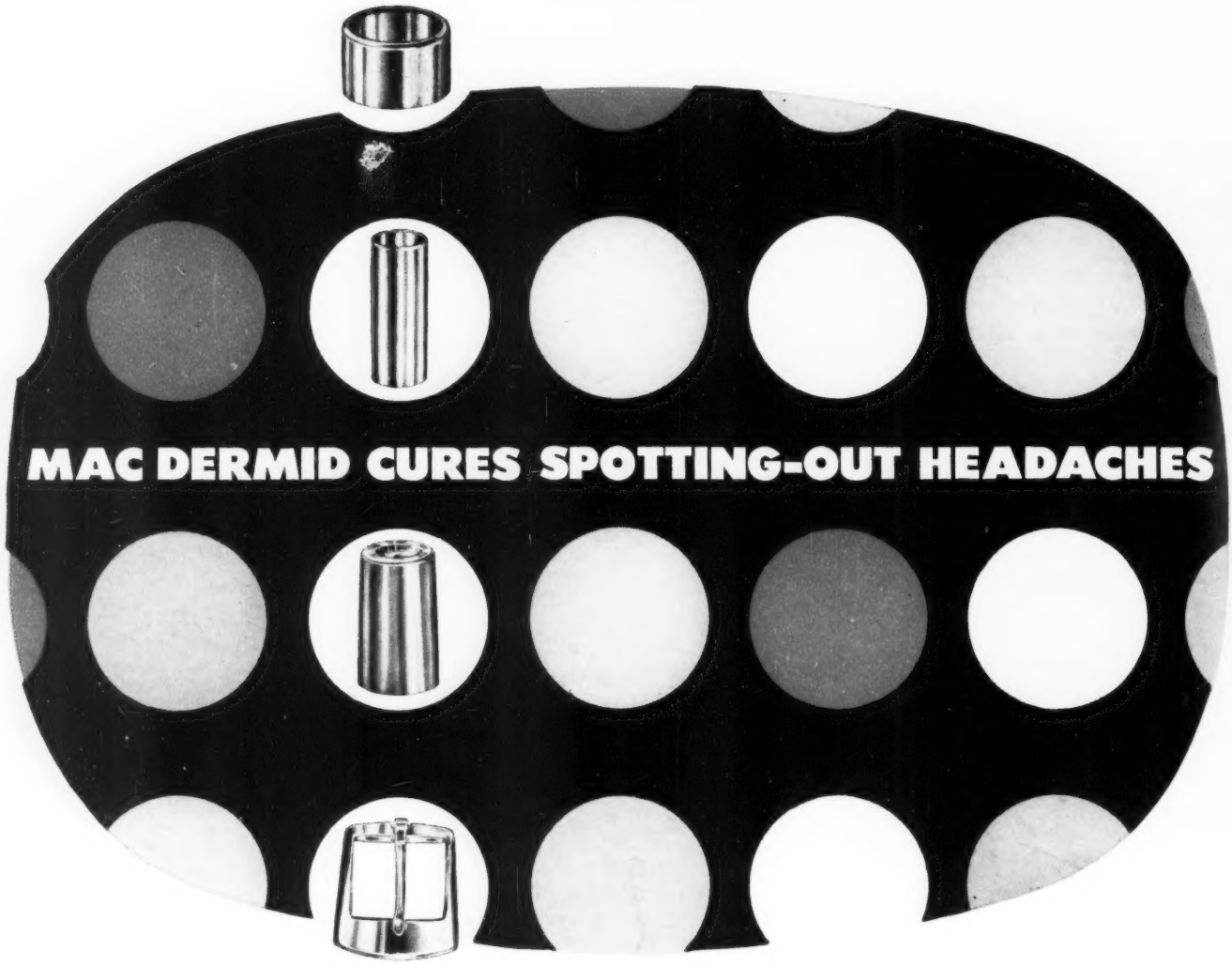

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